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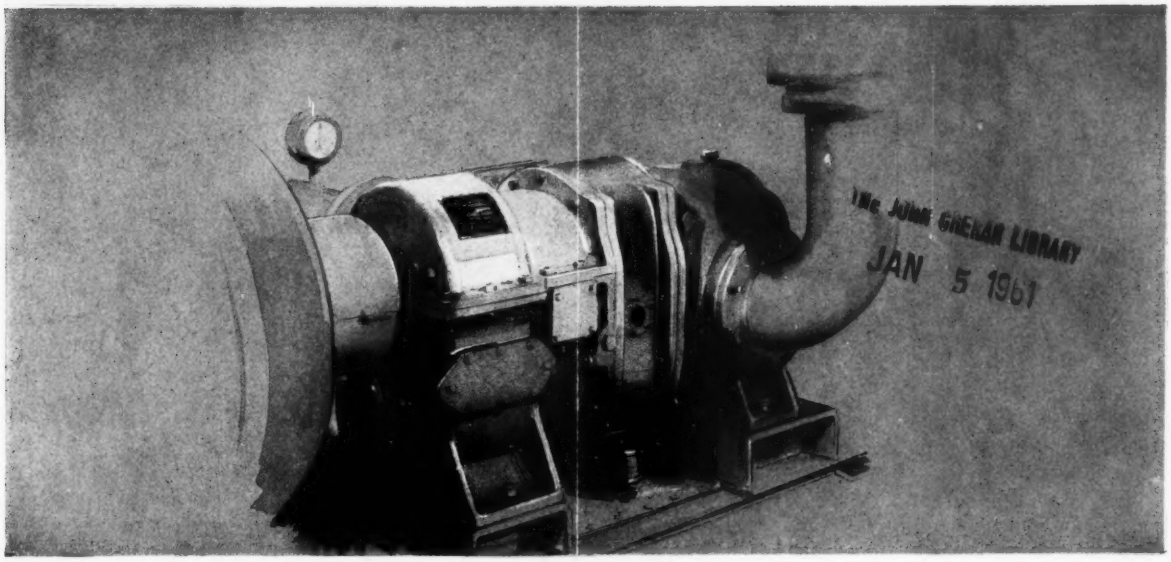

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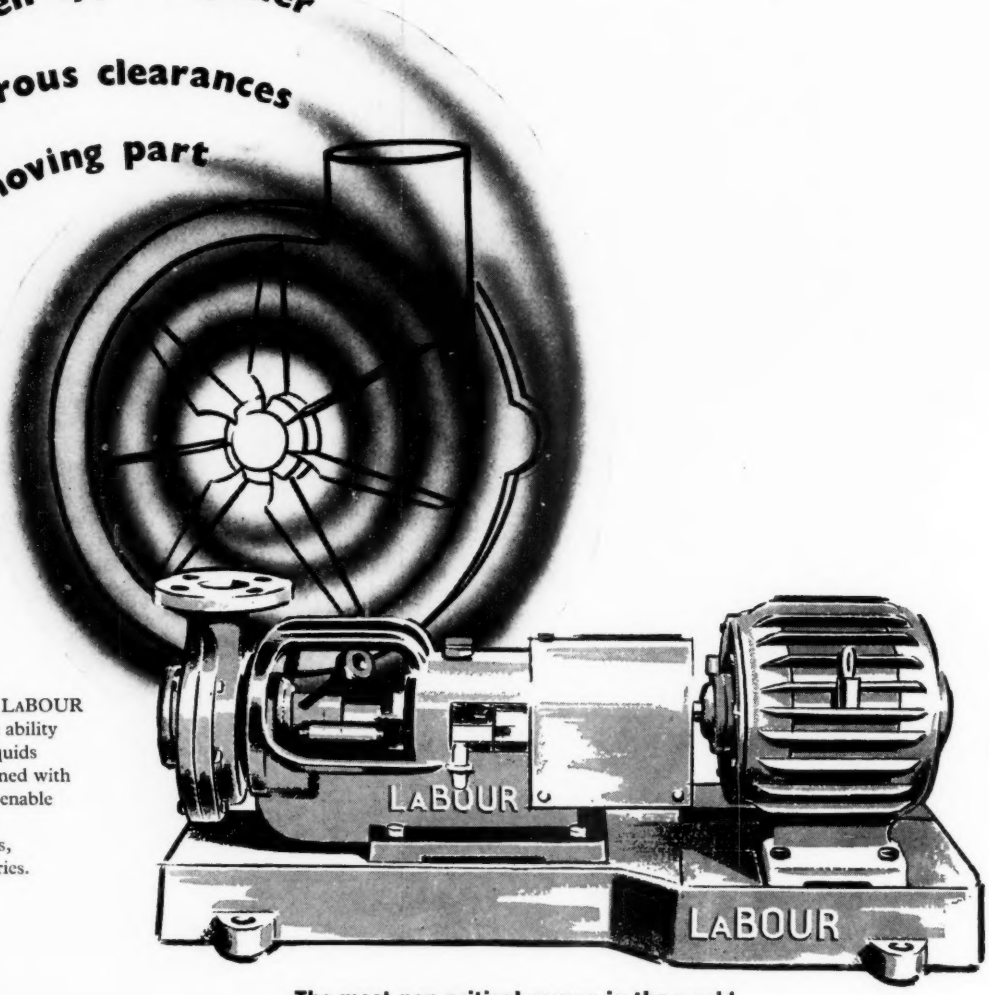

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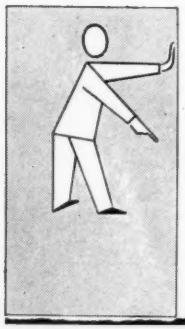

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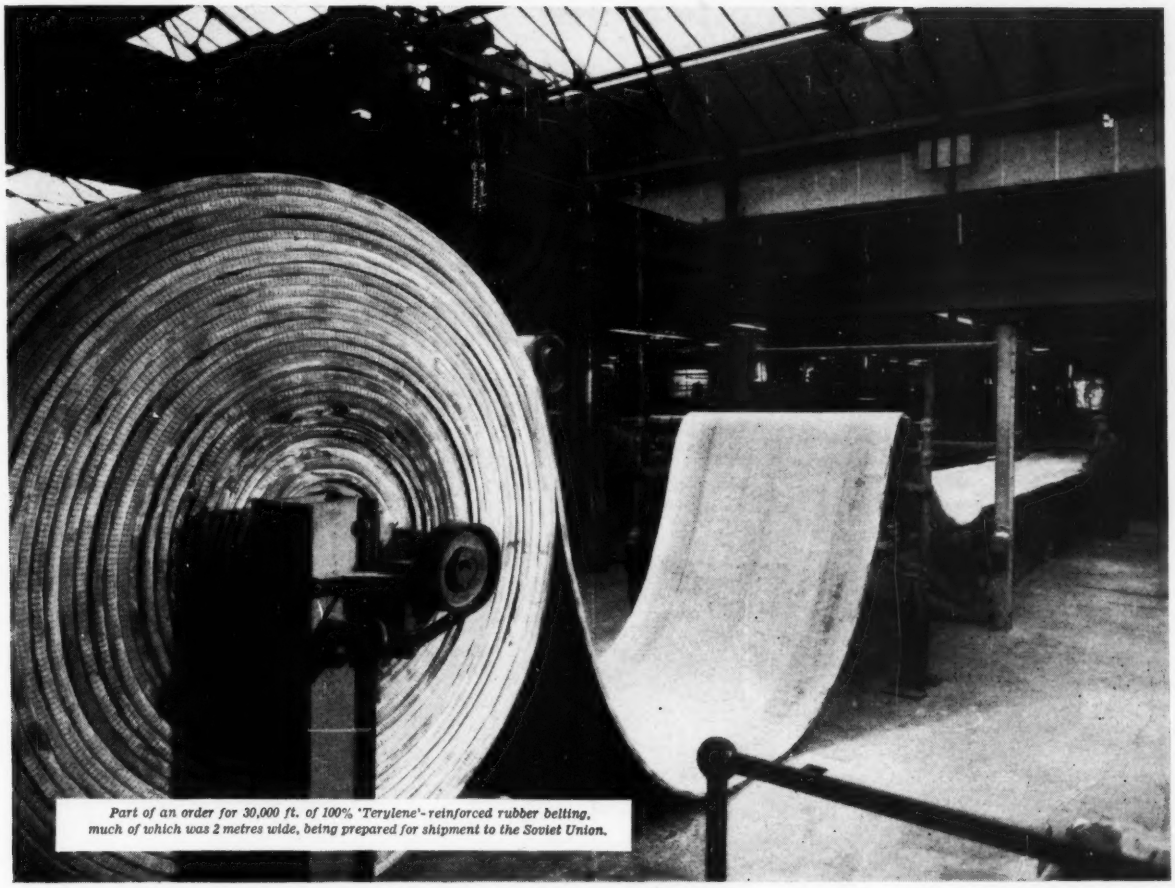

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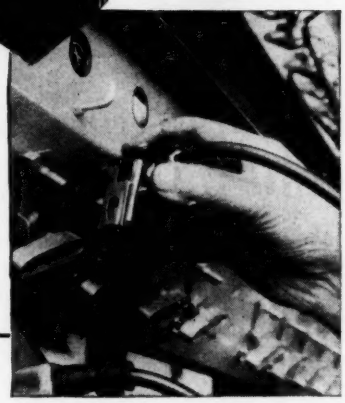

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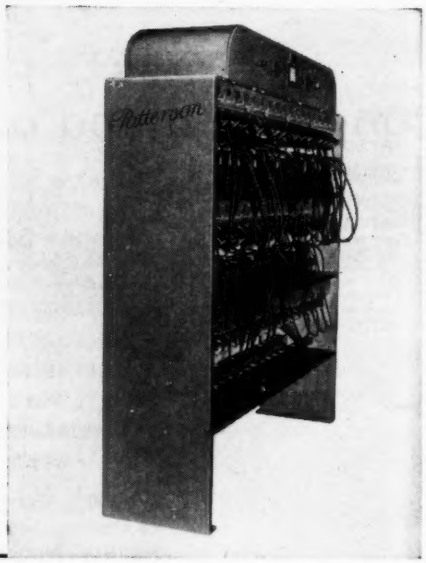

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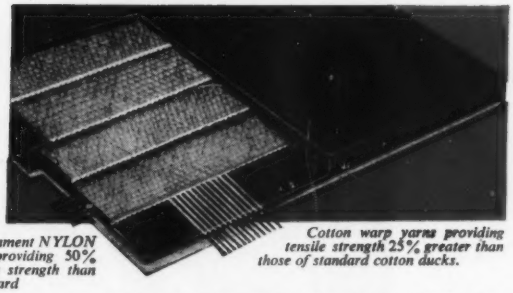

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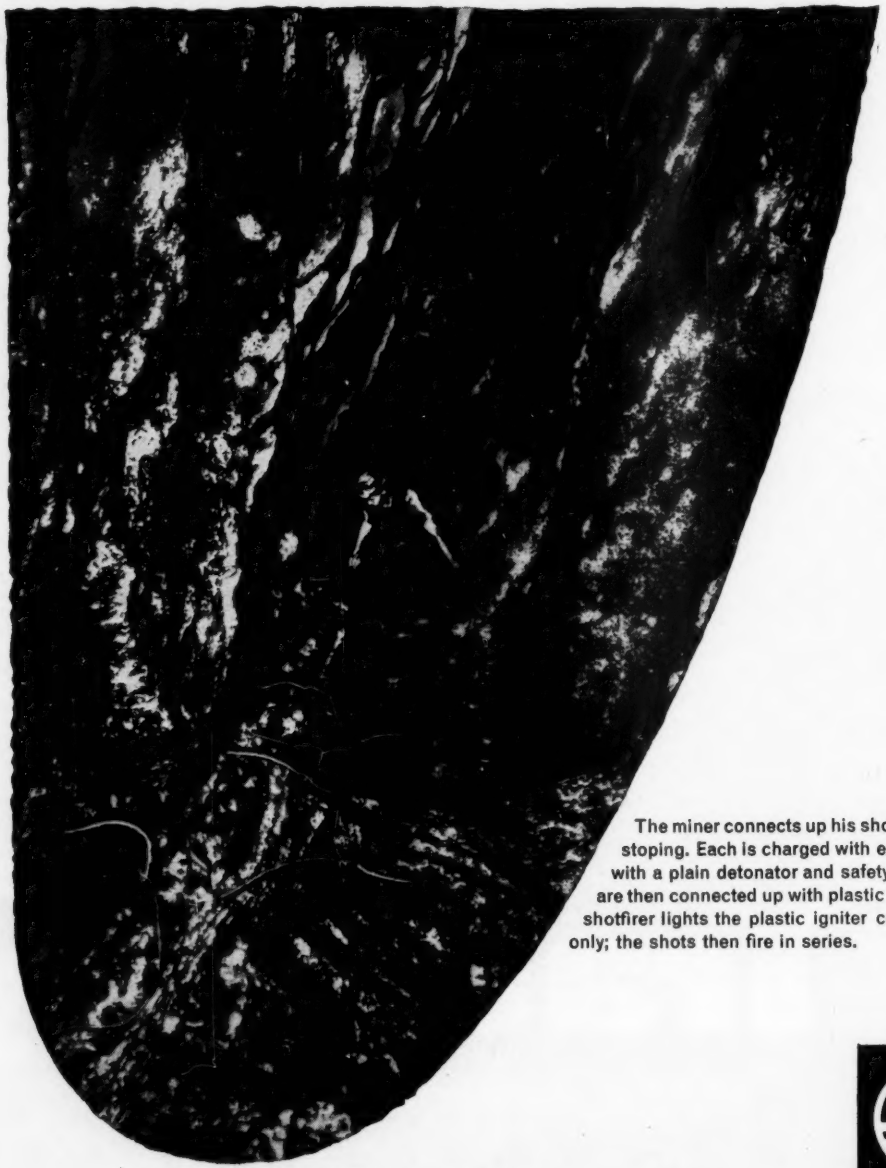

The miner connects up his shots for underhand stoping. Each is charged with explosives primed with a plain detonator and safety fuse. The fuses are then connected up with plastic igniter cord. The shotfirer lights the plastic igniter cord at one point only; the shots then fire in series.

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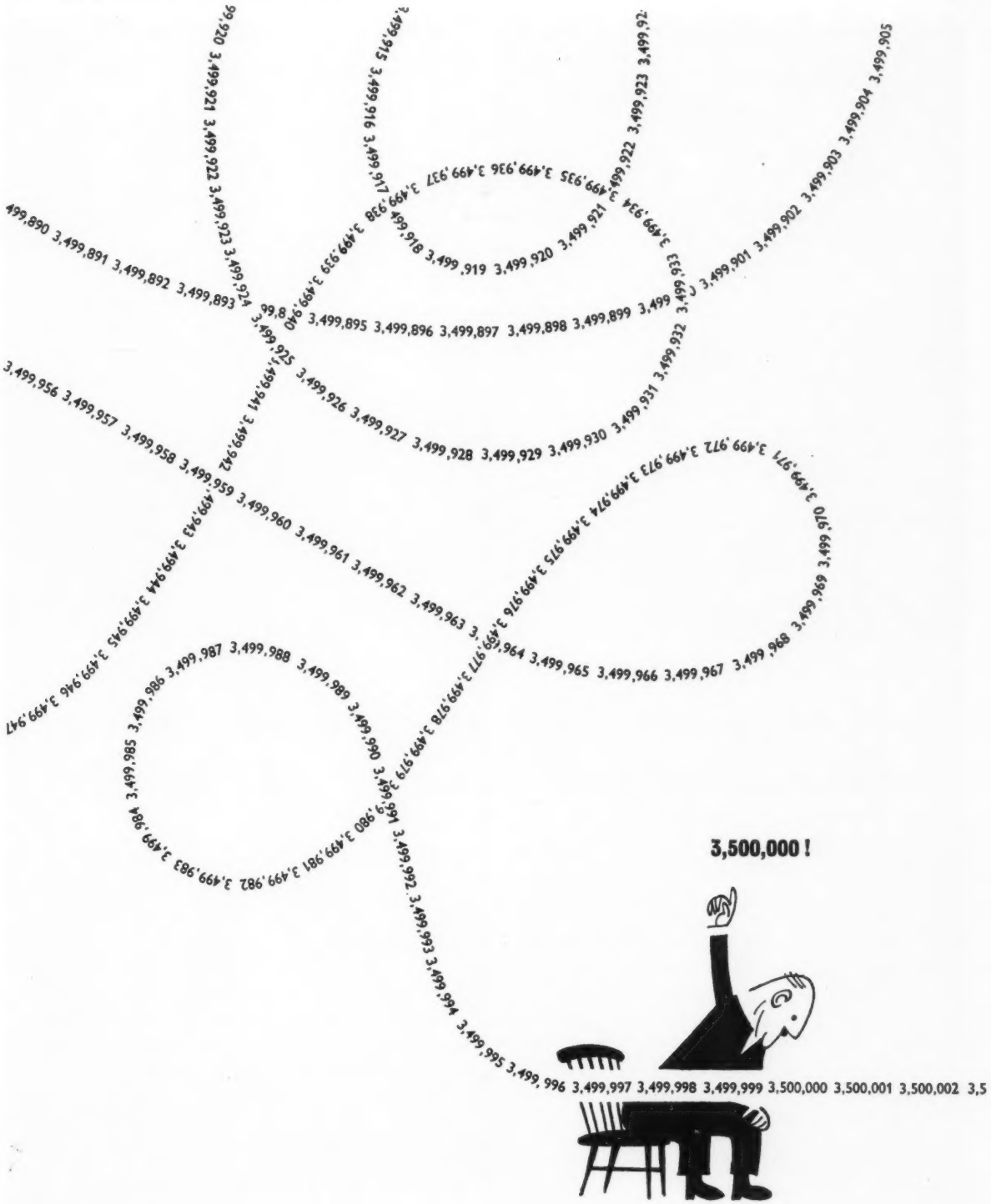

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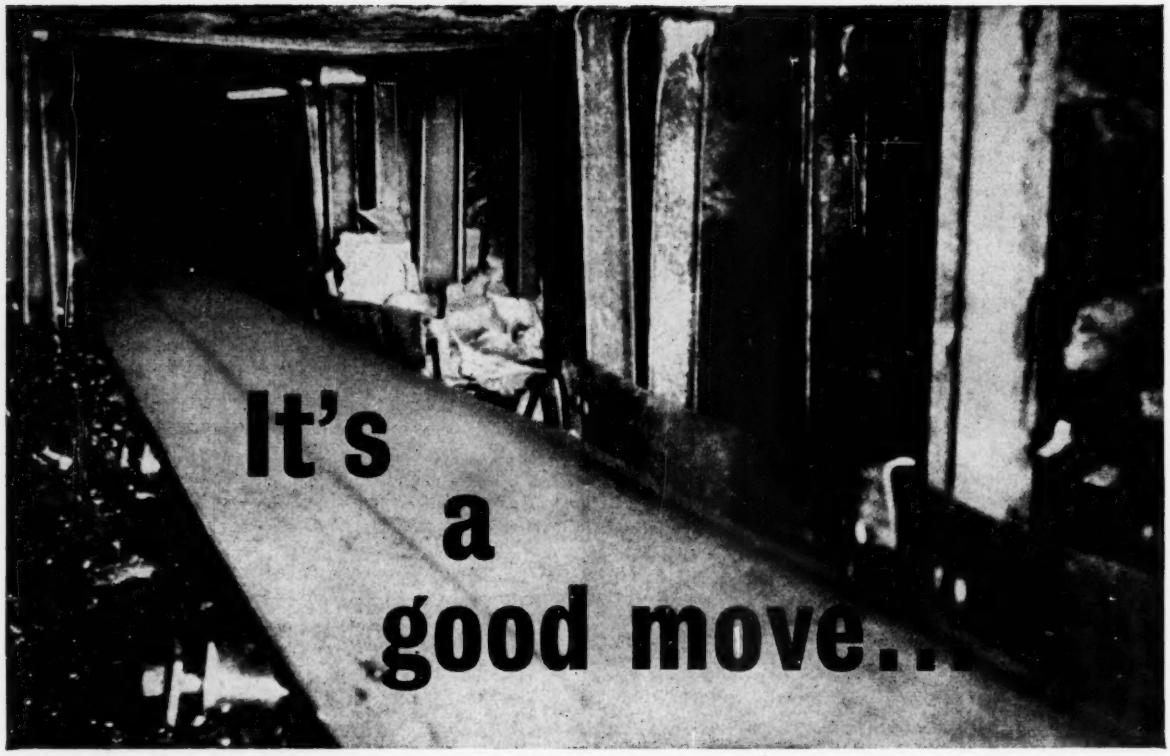

Photograph by courtesy of National Coal Board.

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it's *Nylon* for strength

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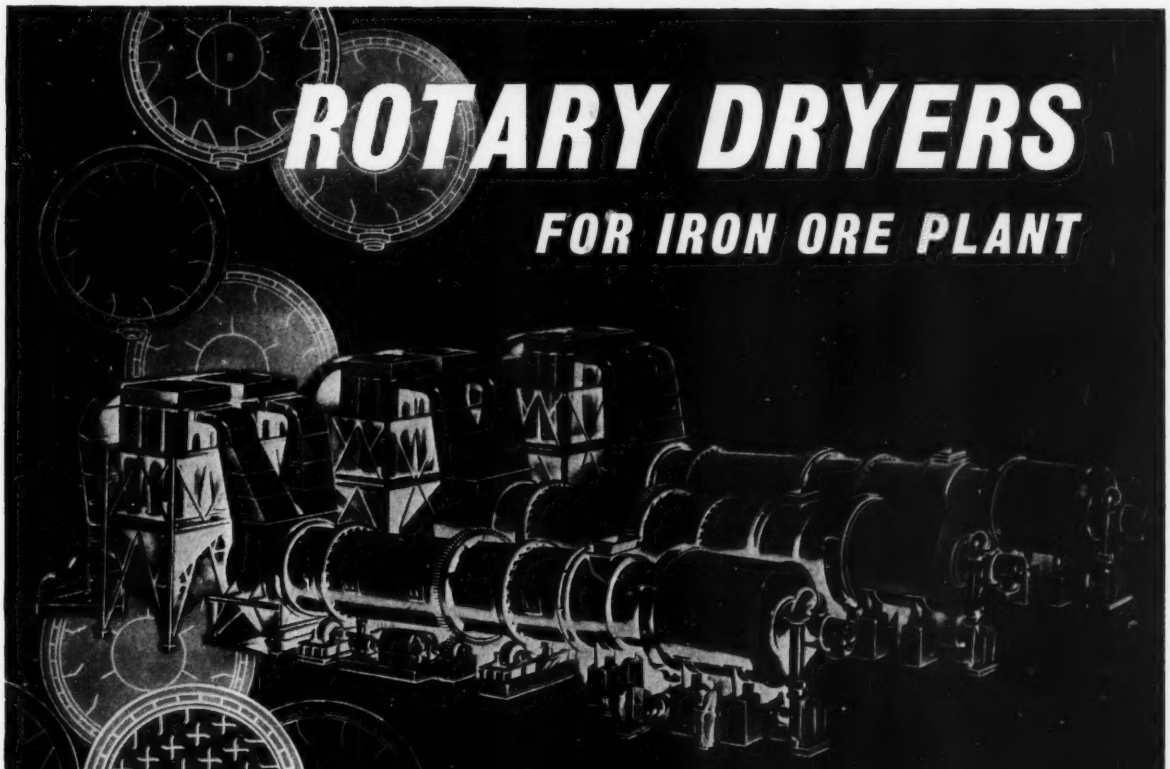
FOR IRON ORE PLANT



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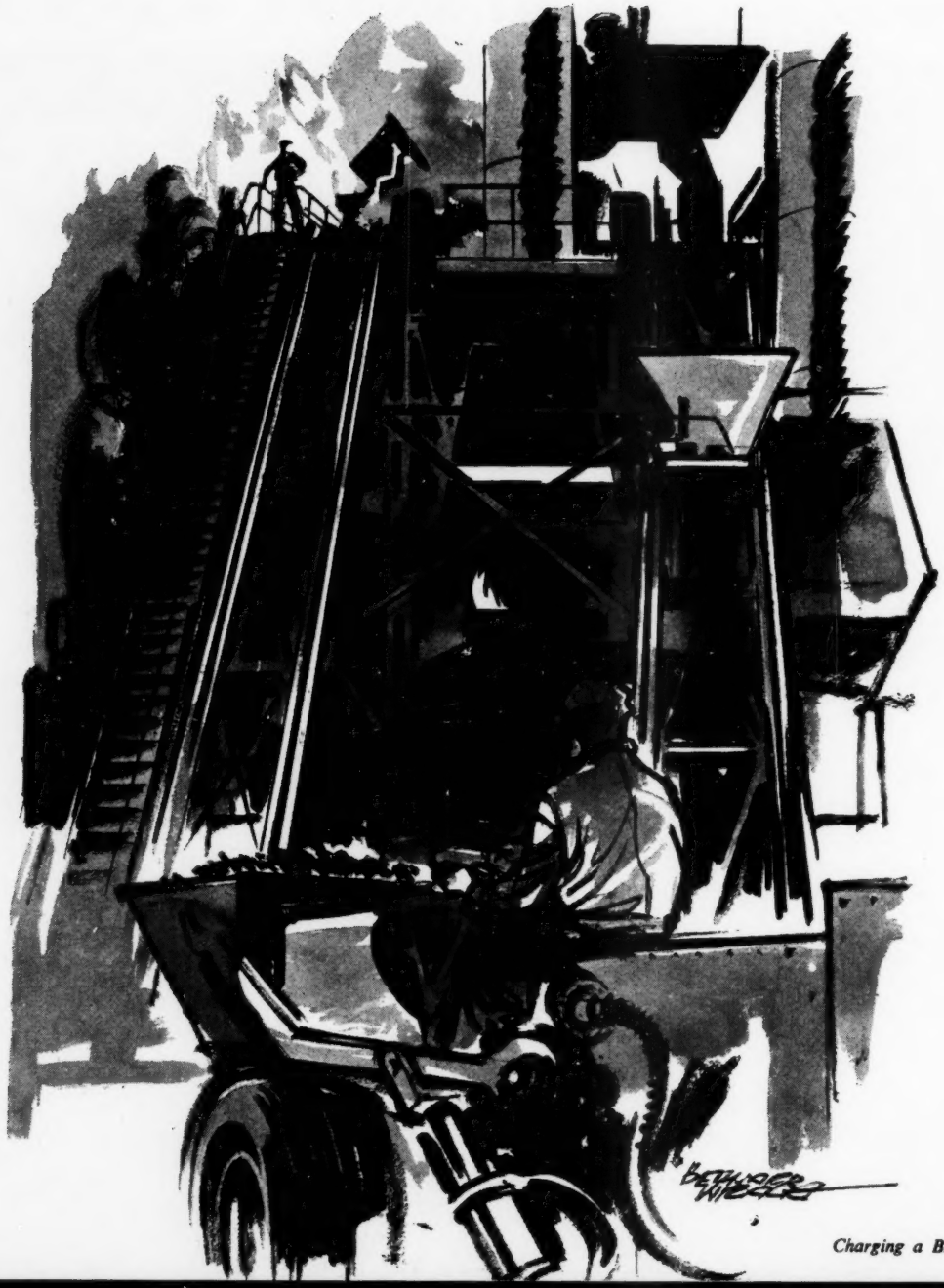

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The Mining Journal

London, December 9, 1960

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Bolivia in Search of Aid

AN interesting sequence of developments has apparently been set in motion by Mr. Khrushchev's offer to supply Bolivia with a tin smelter (*vide The Mining Journal*, Oct. 14, 1960, p. 424). One wonders whether Mr. Khrushchev, in making this remarkable proposition was aware that, in order to produce an acceptable grade of tin, the low grade Bolivian concentrates require to be smelted along with concentrates of a higher grade, and, if so, whether this offer can have been seriously intended.

According to a report emanating from La Paz early in November, the National Commission of Mining Studies and Operations decided that the Russian proposal would be uneconomic and impracticable. Metallurgists in Bolivia, it was stated, believed it would be more advantageous to install washing plants, using as a basis hot hydrochloric acid to raise the exportable tin mineral ore content, rather than smelt the ore at high cost. A few days later, however, the Bolivian Government announced that "the extent of the Russian offer on smelters for Bolivia" would be defined by an official trade mission which was to be sent within the next 30 days to France, Germany, Britain, Holland, Czechoslovakia and Russia. The mission would negotiate credits to be used in the reconstruction of the Bolivian mining industry.

The next development in this rather curious chapter of cold war history came on November 24, when the *New York Times* in a most circumstantial report stated that the Eisenhower Administration had decided to provide economic assistance to Bolivia to forestall the acceptance by that country of an aid offer by the Soviet Union—presumably the proposed smelter. The newspaper said that the United States was prepared to advance $10,000,000 to the Government of President Victor Paz Estenssoro for the rehabilitation of facilities for producing tin concentrates. It added that the U.S. Government was also reported to be ready to provide $5,000,000 immediately to help the Bolivian Government meet budgetary problems, and that the U.S. had succeeded in enlisting the interest of the West German Government in providing Bolivia with credits for new machinery and equipment for her mining industry. The West German concern of Saltzgitter Machinen Aktiengesellschaft, it was stated, had indicated a willingness to extend credits up to $20,000,000, of which $6,000,000 would be for new machinery and equipment and the remainder for improvements in production and management methods.

The report that the U.S. was prepared to offer $10,000,000 to the Bolivian Government for rehabilitation of tin-producing facilities was promptly repudiated by the White House. A State Department official said that the matter was under consideration, but denied that any official decision had been reached. The German Embassy in Washington also refused to comment on the report that the U.S. had succeeded in enlisting the interest of Bonn in providing Bolivia with credits for mining machinery and equipment. However, it has since been announced that the U.S. has, in

fact, agreed to grant a $10,000,000 loan to the Bolivian Mining Corporation (COMIBOL) to finance improvements and modernization of the nationalized company's tin ore concentration process. The transactions would be a loan from the President's Contingency Fund. Terms are yet to be worked out. So it would appear that Mr. Khrushchev's offer, which was enthusiastically received by the Bolivian mineworkers, may yet have fruitful concequences for Bolivia, though hardly within the framework of the Russian proposal!

The decline of Bolivian tin production under nationalization should be a warning to other under-developed countries of the dangers of taking over an important industry without ensuring that the technical know-how is retained.

Since 1952, when the Bolivian Government took over ownership of the tin mines, production has steadily dropped. In the first quarter of 1960, Bolivia exported 3,847 tons of tin concentrates. Last year production totalled 23,900 l.tons, which compares with 34,800 tons in 1953.

How closely Bolivia's economic welfare is bound up with the prosperity of its ailing tin industry is indicated by figures published in a recent issue of *Mineral Trade Notes* (Vol. 51, No. 3, September, 1960). In terms of gross value, mineral exports in 1959 accounted for about 88 per cent of the total exports, compared with 99 per cent of the total exported during past years. Of the mineral exports, tin remains the largest income earner. In 1952 the gross value of mineral exports was $136,000,000, compared with $68,700,000 in 1959.

Most of the Bolivian mineral exports are provided by COMIBOL, but owing to the corporation's decreasing production trend since nationalization, the private mining sector has been slowly increasing its share of the export market. It was expected to do so again in 1960, partly because COMIBOL with no tin stocks and a declining output trend has been unable to take advantage of the removal of export restrictions, and partly because some mineral prices have risen and the private sector is more flexible than COMIBOL in adjusting production to meet world conditions.

According to the same source, the labour force in the Bolivian mining industry is about 42,000 workers, of which more than 27,000 are employed by COMIBOL. Although the mining industry employs only 3 per cent of the nation's total labour force, it provides about 85 per cent of the foreign exchange earning. This imbalance, it is pointed out, places economic power, and by extension, political and social power, in the hands of the miners.

Politically, therefore, Mr. Khrushchev's offer of a smelter may have seemed an extremely shrewd move, however impracticable the proposal may have been. However, it looks as though Uncle Sam has made up his mind to trump this decidedly phoney ace.

The future of the Bolivian mining industry clearly lies in attracting foreign capital and technical aid, finding new ore reserves, and in processing lower grade ores, because most of the high-grade ore deposits are almost depleted. COMIBOL itself has announced plans for exploration of the country's mineral resources at a cost of some $U.S.1,000,000.

It has also been reported from La Paz that, as a result of Bolivia's falling exports of tin, COMIBOL is to be reorganized. Its general director has had talks with Professor Ludwig Erhard, West German Minister for Economic Affairs, with a view to obtaining help in the form of German exports for the reorganization scheme.

THE "SIX" AND THE "SEVEN"

The division of Western Europe into two large trading groups is commented upon by Metallgesellschaft Aktiengesellschaft in a survey of the metal industry in 1959 and the first half of 1960, which prefaces the 47th annual issue of *Metal Statistics*, covering the period 1950-1959.

The setting up of the European Economic Community and the European Free Trade Association, it is stated, has not, to date, adversely affected Europe's economic expansion. Even though the negotiations seeking to combine the two groups have, so far, been unsuccessful, the adoption of a cautious tariff policy in both camps has ensured that trade between the two areas has not been too severely handicapped. It is pointed out that the situation will inevitably change, however, as the tariff barriers between the individual groups are progressively lowered, and the EEC sets up a common tariff scale for its own members when trading outside the group.

The first adjustment of national tariff rates to a common level within the EEC is due to come into effect on January 1, 1961. This move has an important bearing on the metal industry, because EEC's common tariff scale provides for a series of import duties on metals to replace those previously imposed by some individual Common Market countries. In member countries where existing duties on some commodities are lower than those provided by the new scale, a quota system will permit limited imports either free of duty or at favoured rates. The hope is expressed that by this means the traditional trade relations in the metal industry, between the Common Market countries and the remainder of Europe, will be maintained, as well as with the rest of the world. It is to be sincerely hoped, states the survey, that the efforts to achieve economic union between the Six and Seven will meet with success, both in the interests of the actual countries concerned and those of the entire world economy.

GEOLOGY GRANTS TO UNIVERSITIES

Grants ranging from $395 to $4,950 and totalling $50,000 have been awarded this year by the Geological Survey of Canada to 13 Canadian universities for use in research projects concerned with studies in the geological sciences. The grants will support 12 new and 17 continuing projects and were made on the recommendation of the National Advisory Committee on Research in the Geological Sciences.

A grant of $4,950, the largest single award this year, went to McGill University for use in a long-term project designed to acquire further knowledge on the formation of ores and the metamorphism of rocks. In addition, McGill received grants totalling $2,980 for use in one new and two continuing projects.

Two continuing and two new projects are benefiting from grants totalling $8,450 to Queen's University, the largest being a grant of $2,900 for a new study concerned with the crystallization of mica and aimed at obtaining information that will be helpful in the age determination of certain types of minerals. Also included in the $8,450 received by Queen's is a grant of $1,750 to support publication of the *Canadian Mineralogist*, the journal of the Mineralogical Association of Canada.

For use in two continuing and two new projects, the University of British Columbia received grants totalling $7,800. The largest of these, a grant of $2,950, is for a continuing study of the trace elements in soils, rocks, and plants. In one of the interesting phases of this study, a

relation is indicated between a high content of lead in limestone and the incidence of multiple sclerosis in areas underlain by these rocks and the soils formed from them.

Grants awarded to McMaster University totalled $5,050, the largest being $2,450 to support a continuing programme of geochemical studies. Grants for two new projects total $2,600, the larger of which is to support research on the origin and mode of deposition of certain types of minerals in the rocks exposed in the Niagara escarpment.

The University of Manitoba received $4,020 in two grants, one of $1,070 for a continuing project and the other of $2,950 for a new study. The former is concerned with a textural study of sulphide ores when heated. In the latter, the Coronation copper mine in Manitoba is serving as a kind of guinea pig in a co-operative, comprehensive geological, geochemical and geophysical study of an orebody. The aim of this project is to determine the relationship of the buried bedrock topography to the orebody and enclosing rocks.

The University of Western Ontario received $1,700 in two grants of $850 each. One of these is for further research on a method of " operations research " as applied to prospecting and involving the calculation of the spacing of diamond-drill holes, airborne-magnetometer flight lines and the probability of success in prospecting based on past statistical data. The other is for further research on induced and remanent magnetism in rocks, a field of endeavour concerned with providing a means of detecting concealed magnetic mineral deposits.

Grants of $1,150, $950 and $450 were made respectively to Carleton University, Ecole Polytechnique and Lakehead University. The grant to Carleton is for new work on a project that it is hoped will be of significance in prospecting for massive sulphide deposits; that to Ecole Polytechnique is for a continuing project concerned with obtaining a thorough understanding of the distribution and composition of the niobium-bearing minerals at Oka, Quebec. The grant to Lakehead University is for research on a new project concerning the preglacial lakeshore in the northern Lake Superior area.

INDONESIA'S NEW MINERAL REGULATIONS

New development in Indonesia has been hampered by the lack of laws for the mining and petroleum industry and uncertainty regarding the future pattern. A new oil and natural gas Bill has been signed by President Sukarno, but has yet to be approved by Parliament.

The Government has now divided minerals into three categories. Under a new regulation oil, coal, natural gases, iodine, bromium, uranium, thorium and other radioactive materials, copper, mercury, bauxite, tin, manganese, iron, cobalt, nickel and sulphur are classed as " strategic minerals ". They may be exploited only by the central government or the central government in partnership with a provincial government.

The second category is " vital minerals ". These include lithium, gold, silver, strontium, barium, beryllium, magnesium, cadmium, serium, titanium, zirconium, bismuth, chromium, molybdenum, wolfram, palladium, iridium, platinum and diamonds. These minerals may be exploited by state companies, provincial governments, or in certain circumstances, private companies with headquarters in Indonesia and an Indonesian board of directors.

Certain other minerals are classed in a third unnamed category and provincial governments may dispose of the exploitation rights with the approval of the Ministry of Basis Industries and Mines.

The Ministry of Basic Industries and Mines announced that it had set up a special " study group " to investigate mining in Indonesia.

GEOLOGICAL PROSPECTING IN POLAND

In a report presented on November 16 by Seym Deputies, Members of the Seym Committee for the Heavy, Chemical and Mining Industries, and in the debate on the subject, many data were given on the perspectives of the development of geology in Poland.

By 1965 mining output in Poland will increase to 270,000,000 tons and in 1975 to 400,000,000 tons, which means a two-fold increase compared with 1960.

Such raw materials as hard coal, zinc ores, salt and building materials are available in abundant quantities and in the extraction of copper ore and sulphur, Poland occupies a prominent position. But the reserves of crude oil, natural gas, iron ore, aluminium ores, potassium-magnesium salts, pyrites and phosphorites are insufficient to meet the home demand.

About 15 per cent of pig-iron production is covered by home raw materials, 8 per cent crude oil production and about 50 per cent of natural gas production. Nevertheless, scientists and experts say that given more intensive prospecting with the use of more modern equipment, one can expect that rich crude oil and iron ore deposits will be found in central Poland.

The plan of geological works for the 1961-65 period envisages about 2,850,000 m. of drillings and an increase in expenditure by about 60 per cent compared with the period of 1956-60. In the approaching five-year plan the number of deep drillings is to increase almost two and a half times compared with the present five-year plan.

Whilst 5,688,000,000 zlotys were spent on geological work in the period of 1945-59, the amount to be spent in the years 1961-65 will reach 5,318,000,000 zlotys, i.e., nearly as much as in the past decade and a half.

AUSTRALIA'S COAL INDUSTRY AWARD

Application by coal mining unions in Australia for a 35 hour week has been considered by the Coal Industry Tribunal, and the taking of evidence has extended over a number of weeks. In refusing the application, the Judge said " it would be a snare and a delusion to give workers any benefit which would impair the industry which provided their livelihood ". It was considered that in present circumstances, the granting of the application would involve too great a risk. It could bring about a serious loss of production, which could not be made up without working a second shift; and a five hour reduction in the working week could result in an appreciable rise in the price of coal; it would seriously worsen the competitive position of the coal industry in relation to the oil industry; it could result in the loss of valuable markets both in Australia and overseas; and would result in a serious set-back to the steel industry; there might, also, be further unemployment in the coal industry. This very sound judgment is a definite set-back to the union campaign for a general 35 hour week, for the facts presented in opposition to the hour week, for the facts presented in opposition to the face export as well as domestic competition.

A four weeks' annual holiday, however, has been granted in place of the existing three weeks' period, although the conditions in modern collieries are much superior to those in many surface industries that have a shorter holiday.

At left is shown the Lac Jeannine mine and concentrator area. Below, on this page, a cut through along the right-of-way for the railway

Quebec Cartier's Iron Ore Development

By

J. GRINDROD

IN order to supply iron ore to the furnaces and steel mills of Canada, Europe and the United States, The Quebec Cartier Mining Co. are currently pushing ahead with what is claimed to be the largest mineral development programme in the province of Quebec. Quebec Cartier is a wholly-owned subsidiary of U.S. Steel and the project is the second such development on the North Shore area of the province of Quebec in recent years, the first having been under the promotion of the Iron Ore Co. of Canada. The iron ore deposits under development lie in the so-called Quebec Labrador Trough which extends from Lac Jeannine to the far northern area of the Ungava Peninsula.

It was in 1952 that The Cartier Mining Co. Ltd., started intensive field investigations in the south-western section of the Quebec-Labrador Trough in Saguenay County and, in 1957, Quebec Cartier Mining was incorporated under the laws of the Province of Quebec for the purpose of exploring and developing low grade iron deposits in that area.

The results of this operation revealed the presence of several deposits of low grade iron ore formation, which research indicated could be treated at the site of the mining operations to a commercially usable iron concentrate. As a result, the company drew up a many-sided programme involving a cost of more than $200,000,000 and

At right, Port Cartier harbour construction work. Below, the general topography through which the Quebec Cartier railway is driven

the development of a large open pit mine, a huge concentrator, a 193-mile railway, a deep water harbour on the St. Lawrence River at Port Cartier, a hydro-electric power plant and two completely new townsites.

Each of these seven high-priority projects, completion of which is scheduled for the end of 1960, is a major undertaking by itself and intense activity is taking place along the whole of the 200-mile front. Earlier in 1960 there were 6,500 men employed by the contractors and Quebec Cartier Mining in the various stages of construction work and it was anticipated that this number would be increased to as many as 8,000 during the summer. For normal production operations, however, a total of 2,000 persons approximately will be employed at Lac Jeannine and Port Cartier.

Consisting of specular hematite ore, the Lac Jeannine iron deposit extends approximately 8,000 ft. lengthwise and 2,300 ft. in width. The downward extension of this orebody exceeds 1,000 ft. and it could become one of the deepest iron ore mines on the North American continent. It is estimated that a day's production will run to approximately 60,000 tons of ore or 1,500 large truck loads on a year-round production basis, for a total annual production of some 20,000,000 tons of ore. With a designed capacity of over 8,000,000 tons of iron ore concentrates annually, the concentrator will be the largest iron ore beneficiating plant in the world. Power to the project will be supplied by the Hart-Jaune Power Co., an affiliated company, which will construct a hydro-electric plant with an initial capacity of 60,000 h.p.

In the early mining stages, some 3,000,000 cu. yds. of overburden and 9,000,000 tons of rock must be removed. This will cut a 100 ft. strip right around the entire orebody. Initially, there will be three separate pits and by the time production starts, it is planned to have some 11,000 lineal feet of 40 benches in ore for extraction.

Although the flying distance between the mine and Port Cartier (formerly Shelter Bay) 25 miles west of Seven Islands on the St. Lawrence, is about 140 miles, the railway has to make numerous detours because of the difficult country and will cover 193 miles. It will be operated under the name of La Compagnie de Chemin de Fer Cartier and including 17 bridges and five tunnels, will have taken two years to build on completion.

This railway is expected to be placed in operation in 1961 and it will continue to give service at about the same rate in winter as in summer, since it is expected that ships will be able to load at Port Cartier during most of the winter months. The first 1,800 h.p. diesel locomotive for the railway was delivered by its builders, Montreal Locomotive Works Ltd., in January last. It is one of 17 locomotives which will be needed initially to operate the new railway and they will work in groups of four to provide the 7,200 h.p. required to draw each train of 125 wagons. The journey from the mine to the port is expected to take about 8½ hours. By the end of August, 1960, 150 miles of grading had been completed and 110 miles of track laid. All of the 17 bridges and four of the five tunnels had also been completed. The locomotives have been equipped with a special type of brake shoe and, because they will haul the iron ore concentrate throughout the winter, have also been installed with a number of features to facilitate winter operations.

Planned to be one of the deepest harbours in Canada, Port Cartier is being carved out of the solid rock of the shore line and will go to a depth of 50 ft. below the low water level. It will be capable of handling the largest ore carriers afloat and of the future. This section of the project alone involves the removal of over 8,000,000 tons of rock to form a large basin, 250 ft. x 450 ft., cut into sheer rock with a narrow 500 ft. inlet and protective walls or breakwaters extending into the open estuary to cut off the swell action of the water and provide safe and protected berths for shipping.

In this, one of the largest excavations in recent Canadian history, blasting is being carried out with the use of new low-cost C-I-L explosives developed in Canada. Wetness in some areas of the work limited the usefulness of the less water-resisting blasting agents such as the ammonium nitrate and fuel oil mixtures which, in addition, had not sufficient density and strength to ensure good fragmentation under hard-breaking conditions. To overcome these difficulties, the contractors consulted C-I-L's explosives division and with technical help from them adapted the new blasting agent Hydromex for this type of work.

Comprising a mixture or slurry of TNT, ammonium nitrate and water, Hydromex was being used in open pit iron ore mines at the time the Cartier harbour works were started. It is denser and more powerful than conventional blasting agents and it is also water compatible, the water actually playing a part in the detonation process. Its high velocity of detonation gives good fragmentation.

As used in the Cartier Harbour project the Hydromex is loaded into the bottom of the boreholes to provide sufficient energy for breaking the toe. When the holes are dry they are topped up with ammonium nitrate and fuel oil mixtures, but in the case of wet holes a high explosive such as Forcite is being used to fill up the hole on the top of the Hydromex.

The Hydromex then expands to fill the borehole completely, thereby eliminating air spaces and ensuring a load of maximum density and strength. A Baughman truck is being used for feeding the ammonium nitrate prills into the hole. These are first mixed with the fuel oil to predetermined proportions and then blown through a hose into the drill holes.

Two new townsites for a combined population of over 6,000 persons, one at Port Cartier on the St. Lawrence estuary and the other at Gagnonville, Lac Barbel, 200 miles north of the terminal point are being built to accommodate the employees of the company.

Mineral Resources of North-East Brazil

(from Our Own Correspondent)

RECENT measures to increase Brazil's mineral production and exports include : (1) transfer of raw materials and industrialized products to the list of merchandise for which exporters may sell their bills at free market rates, thus ensuring bigger profits; (2) organization of a shipping company with mixed state and private capital to purchase, or charter, and administer a fleet of ocean-going steamers to convey Brazil's mineral exports to destination and bring coal on return trip, thereby reducing and stabilizing freights; (3) reform and re-equipment of railways serving mines to permit higher speeds and heavier loads; (4) creation of a Ministry of Mines and Energy to take charge of all matters concerning mineral production, mines and metallurgy, export of strategic materials, water and electric energy and petroleum (with the exception of petroleum all hitherto subordinate to the Ministers of Labour or Agriculture, neither of which were equipped to deal with them efficiently); (5) promulgation of a law to stimulate production and industrialization of minerals in backward areas of north and north-east Brazil and Bahia. These regions, in which 37 per cent of Brazil's population is scattered over 60 per cent of her territory, are highly mineralized but lack material and financial resources for development.

The new law exempts imports by those states of mining and processing equipment from payment of customs duties and charges; exempts from income tax during twelve years those industries that process and refine minerals extracted locally; authorizes local mining companies to deduct operating expenses from taxable income.

Wide-Scale Prospecting

Under the Brazil-U.S. agreement large tracts of the north and north-east have recently been exhaustively prospected, revealing the existence of over twenty varieties of minerals, including rutile, ilmenite, scheelite, magnesite, copper, chromite, manganese, lead, cassiterite, iron, barytes, asbestos and beryllium. The government aims to increase production and utilization of any of these that exist in significant quantities.

Rutile of good quality and in commercial quantities exists in Pernambuco and Ceara, while *ilmenite*, associated with *monazite*, abounds, and is exploited, on the beaches of Bahia and the south.

Scheelite : High-grade deposits have been proved in Rio Grande do Norte and Paraiba. Eight mines are being worked in the former state by primitive processes and two in the latter. Only one company, the Brazilian subsidiary of the Wah Chang Corporation, is well equipped. Production increased from 1,305 tonnes in 1956 to 2,127 tonnes in 1958.

Magnesite : Brazil's most important known deposit is at Brumado, in Bahia; the mineral is of the crystalline type and occurs in pre-Cambrian dolomite, associated with talc and rock crystals. The local mining company had to refuse orders to export 12,000 tons annually owing to transport deficiencies. Rail and port facilities are now being improved. Ceara, further north, has eight deposits in limestone formations near Iguatu. The U.S. Geological Service reports these occurrences of high grade.

Copper, Chrome and Manganese

Copper : The most important mines North of Rio are at Vicosa, in Ceara, and at Caraiba, Bahia. The Caraiba deposits have estimated reserves of 40,000,000 tonnes of ore with 1.5-3 per cent Cu., capable of yielding 360,000 tonnes of metal. The Pignatari group are investigating the prospects of exploiting the Caraiba occurrences economically, but their findings have not been announced. Consulting engineers suggest that electric reducing furnaces, or hydro-metallurgic treatment, would best solve the problem of industrialization. Ample power would be available from the government's hydro-electric station at Paulo Afonso.

Other occurrences of copper in north-east Brazil are those of Pedra Verde, in Ceara, which have been idle since 1958 owing to legal proceedings; Picui, in Paraiba, and Grajau, in Maranham. All these are to be fully examined. The Wah Chang Corporation and the Molybdenum Corporation of America have announced joint plans to produce copper concentrates in Brazil, but gave no details of their project.

Chromite : Bahia, the principal producer, contributed 4,020 tons of Brazil's total production of 5,748 tonnes in 1958. Bahia has seven registered mines, the most important being those of Pedras Pretas, in the Santa Luzia district; Cacabulhos, in Campo Formosa, with visible reserves of 500,000 tonnes and probable reserves of 4,000,000;

Boa Vista, in the Saude district with estimated reserves of 200,000 tonnes. Other occurrences are known to exist at Canso Cavalo, Brejo Grande, Limoeiro and Angelim, in Bahia. In all these occurrences mining would be relatively easy, but transportation will present difficulties until the programme of railway reforms and re-equipment is completed. For the present the mineral would probably have to be processed on the site. The known reserves are ample for local consumption during many years.

Manganese : One of the two most valuable of Brazil's hundred odd registered manganese mines is that of Serra do Navio, in the Amapa Territory, with estimated reserves of 40,000,000 tonnes of 46-54 per cent Mn. Industria de Comercio de Minerais (ICOMI), associated with Bethlehem Steel, holds a concession to exploit the mines during 50 years, reckoned from December, 1956. The Urucum deposits, in Mato Grosso, exploited by the Chamma Brothers, with the participation of U.S. Steel Corporation, have estimated reserves of between 45,000,000 and 60,000,000 tonnes of 45-50 per cent Mn.

Other registered manganese mines north of Rio exist at Manicore, in Amazonas, and in Bahia at Jacaraci, Jacobina, Miguel Calmon and Santo Antonio de Jesus, where a group of six mines are in production. Brazil's exports of manganese rose from 695,042 tonnes in 1958 to 914,000 in 1959.

Other Mineral Occurrences

Lead : Over twenty deposits of lead-silver minerals await prospecting in the Sao Francisco Valley, but the only registered mine north of Rio is at Boquira, in the Macuba region of Bahia. This, Brazil's most important known occurrence, started production in 1956 and produced 8,094 tonnes in 1958. The Torelli group and Prest-O' Lite Co. are installing plant at Santo Amaro, Bahia, to process 1,000 tons of Boquira ore monthly. Another Bahia deposit that may prove valuable is that of Santa Se, where prospecting was started in 1959.

Cassiterite : Three mines are registered north of Rio with the Department of Mineral Production, namely Igaripe dos Indios at Macapa, in the Amapa Territory, Serra Branca, in the Pedra Lavada district of Paraiba, and Seridozinho, in Ibianopolis, Paraiba. Other occurrences, not yet examined, are known in southern Bahia, at Picui, in Paraiba, and in the Licui-Parelhas area of Rio Grande do Norte.

Iron : Two mines are producing in the Macapa district of the Amapa Territory, one a private concession, the other the property of the state government. Several other occurrences are known to exist in Bahia, in the Middle Sao Francisco and Rio de Contas Basins, at Brejoes, Jequirica and Jequia, but all await final prospecting.

Barytes : Bahia is Brazil's biggest producer and three mines of the Camamu group guarantee domestic needs for many years to come. Production increased from 14,694 tonnes in 1956 to 62,260 in 1958, practically all extracted from the Camamu deposits. Domestic consumption is relatively small, but exports increased to 45,407 tonnes in 1958, from 280 in 1956.

Asbestos, chrysotile and tremolite, is exploited on a small scale in four north-eastern states, but Bahia is the biggest producer, the most valuable chrysotile mine being at Pocoes, with reserves of 4,600,000 tonnes of 2.5 per cent amianthus. Output averages 30,000 tons of ore annually.

Beryllium : Rio Grande do Norte, Paraiba and Ceara, in the north-east, and Bahia in east Brazil are the biggest producers. The demand from the U.S. has declined recently, owing to competition from other sources, and production dropped to 1,175 tonnes in 1958.

Humboldt Grate-Kiln System

SUCCESSFUL operation of two grate-kiln systems at the Humboldt Mining Co., United States, has confirmed the feasibility of producing higher quality iron ore pellets from low grade ore deposits. Located near Ishpeming, Michigan, as a joint venture of Cleveland-Cliffs Iron Co. and the Ford Motor Co., the Humboldt plant is the first installation of the grate-kiln system applied to iron ore agglomeration.

The pelletizing system used at Humboldt Mining was developed and manufactured by Allis-Chalmers to utilize process advantages of the travelling grate and rotary kiln. Results have been favourable. Humboldt Mining reports reaching rated production of over 1,000 l.t.p.d. with a fuel consumption of approximately 1,000,000 b.t.u. per l.ton. This compares favourably with the best results achieved elsewhere when processing magnetite.

Operations include a large open pit ore reserve, a complete crushing/grinding circuit and beneficiation equipment, in addition to the pelletizing plant. Two parallel lines of Allis-Chalmers travelling grate/rotary kiln equipment are each rated 1,000 tons per day (l.t.p.d.) of pellets containing a rich 62 per cent total iron.

Production of specular hematite from Humboldt's open pit mine and newly-expanded concentrator is now 2,000 l.t.p.d. of concentrates, beneficiated in operations employing a flotation technique. Following concentration to more than 60 per cent total iron content, the hematite is balled in large dia., 30 ft. long balling drums. Balls are screened to permit only properly sized feed to enter the double pass travelling chain and grate section.

In the first or drying section, the green balls are subjected to a downdraft of approximately 600 deg. F. gases. This action dries the pellets and, at the same time, employs the moist pellet bed as dust collector for the process gases. The process gases are exhausted to atmosphere at about 250 deg. F. Then, passing under a dividing baffle, the pellets enter the pre-heat section where high-temperature kiln exit gases are drawn through the bed to effect pre-heating and preliminary pellet hardening.

In order to achieve product uniformity and to accomplish the high temperatures processing in a machine best adapted to this phase, the pellets are then discharged from the travelling grate into a 120 ft. long rotary kiln where the final heat treatment to approximately 2,450 deg. F. is accomplished.

The product from the kiln is discharged into an annular cooler, cooled by an updraft of ambient air and delivered to the product belt (made of rubber). This cooling air recuperates the heat in the pellets, delivering it to the kiln as hot secondary air. After cooling, the product is a hard, dense, uniform pellet that is shipped by ore boat from Marquette, then charged into blast furnaces.

The electrical system conceived by Allis-Chalmers for the balling operation of the Humboldt Mining Co. includes precise control with variable speed regulation, plus exact proportioning of ore feed and additives to balance varying feed conditions and system capacities.

A table feeder passes the ore concentrate to a mixer located on each balling drum feed conveyor, where bentonite, and ore are mixed in transit in definite proportions by weight. Each balling drum is driven by a d.c. motor powered by a " Magna-Speed " drive which allows ± 1 per cent speed control at all balling drum speeds.

Basically, this Allis-Chalmers drive provides regulated variable voltage to the armature of the d.c. drive motor, thus replacing the conventional motor-generator in a d.c. Ward-Leonard drive system.

Research in Mining Geology

THE Royal School of Mines represents mineral engineering within the Imperial College and the activities reviewed in the 69 pages of its Research Report 1957-60 cover an extremely wide field, ranging from mining geology, applied geochemistry, oil technology, and applied geophysics to extraction and physical metallurgy, and to mineral dressing and mining. This summary is confined to the sections of the report relating to mining geology and applied geochemistry.

The past three years have marked an unprecedented activity in mining geology research, states the report. Investigations have been made of a wide variety of economic mineral deposits, covering mineralization processes, genesis and structural control.

Copper: A comprehensive study has been made of the structural control, zoning, mineralogy and mode of emplacement of orebodies at the Yauricocha Mine in Peru, situated in the Central Andean Region at about 15,000 ft. Copper, lead, zinc, gold, silver and bismuth are the principal metals extracted from the ores. The mineralogy of the tabular cupriferous orebodies at West Avoca, Ireland, has also been investigated. Work has been continued in the Huelva province of Spain, with a study of the cupriferous pyrites deposits at Cueva de la Mora, about 30 miles west of Rio Tinto. The concession has been mapped in the search for similar structures favourable to copper mineralization.

Work has been completed on a lead-zinc prospect on the northerly extension of the Mount Isa deposit in Australia. Further study of the ore and its alteration is in progress to elucidate the mode of origin of the deposit. An intensive study has also been made of specimens from the Sullivan lead-zinc orebody in British Columbia. The relation of mineralogy to depth and wall rock, and the structural control of ore-shoots form the main topics of research at the Greenside Mine in Cumberland, the lead mine selected recently by the Atomic Energy Authority for testing underground explosions. Research has also begun in the Skiddaw, Saddleback and Caldbeck Fells area about 6 miles N.W. of the Greenside Mine, in an attempt to elucidate the structural history of the region and to correlate the complex groups of copper-lead-zinc-tungsten-barium veins which abound in the area.

Gold: Both field work and laboratory work have been continued on the gold-quartz vein deposits of Ghana. Following an earlier study of the general geology, a more detailed examination has been made of the structure and mineralogy of the deposit at the Konongo mine. A general investigation has also been made of the deposit at the Obuasi Mine, relating the structure to the occurrence of gold. At present a compilation is being made of the abundant literature on the West African goldfield published by the Ghana Geological Survey and of work carried out in the Royal School of Mines.

Tin: Underground studies have been carried out at the Geevor Tin Mine on the N.W. coast of Cornwall. Field and underground mapping have been completed of the Kamatavi Tin Belt, situated in the north-western part of Southern Rhodesia.

Tungsten: Vein mineralization associated with a granite - gneiss complex in the Grey River area on the south-east coast of Newfoundland has been mapped. Certain aspects of the tungsten mineralization of the Minas do Panasqueira in Northern Portugal have been investigated.

Other Minerals: Field mapping and laboratory studies have been completed of what is believed to be a new type of vanadium deposit in Africa, at the Minas do Lueca in Northern Angola. Laboratory studies of ore specimens collected from several uranium mines in the Blind River area of Ontario, Canada, have been carried out. The Guleman-Sori chromite deposits of south-eastern Turkey have been the subject of a field and laboratory survey. The form and structural relationships of high-grade hematite orebodies formed during widespread mineralization in Western Cumberland, have been studied at the Haile Moor Mine, near Egremont. Investigations of the barite mineral deposits of the Clyde Plateau area of Scotland have been continued following the reopening of the Muirshiel Mine in Renfrewshire. The petrology and mineralization at Muirshiel is being compared with that at the Gasswater Mine to the south and other barytes mines in the area. Detailed investigations by means of X-ray and reflection microscopy have been made of the mineralogy and paragenesis of several manganese deposits in Greece.

Geochemical Prospecting

The activities of the Geochemical Prospecting Research Centre also continued on an increased scale during 1957-1960. As in previous years, the work of the Centre was largely concerned with (a) critical investigation of geochemical prospecting techniques under a variety of conditions; (b) development of new analytical and field methods; and (c) research on the fundamental principles involved in the formation and detection of geochemical dispersion patterns. Within these major groupings there has been, in general, a shift in emphasis from detailed studies in very limited ares of known mineralization to the examination of problems associated with regional prospecting and provincial scale geochemical mapping.

Field work was undertaken in a large number of overseas territories, as well as the British Isles, the former including Bechuanaland, Burma, Malaya, Nigeria, Northern and Southern Rhodesia, North Borneo, Sierra Leone and Tanganyika. Most of the field studies were concerned, at least in part, with investigating the factors controlling the dispersion of specific elements from mineralized bedrock. On the basis of the results, geochemical prospecting methods were developed for beryllium, copper, cobalt, niobium, lead, tin, zinc and uranium. The successful outcome of this work is clearly demonstrated by the large scale on which an ever-increasing number of organizations are using geochemical prospecting techniques.

Apart from geochemical drainage and soil surveys, work has been carried out on the possibility of producing geochemical maps analogous to geological maps. If the interpretation of the results obtained during geochemical mapping is to yield the maximum useful data, it is essential that the mechanisms controlling the movements of the elements and their minerals should be understood as fully as possible. The current projects are expected to supply some of this fundamental data. Geochemical mapping will have a high priority in the immediate future. However, other aspects of geochemical prospecting will also be studied.

Machinery and Equipment

Conveying Around Corners

The Stubbe Serpentix conveyor, for which Mitchell Engineering (Pty.) Ltd. have the South African agency and manufacturing rights, is considered as opening up new fields of application. The range consists of nine models of varying conveyor widths, capacities and speeds, and designed for specific purposes. The equipment has been described in *The South African Mining and Engineering Journal*.

The smallest model of the range, designated the 500 V, has a belt width of 500 mm. and an operating speed of 1 m. per sec., with a load capacity of 68.4 t.p.h. (bulk density, 50 cu. ft.). The largest is the 1400 S, a rigid type conveyor with a belt width of 1,400 mm., and load capacity of approximately 1,300 tons an hr. These performance figures are based on minimum operational speeds. In practice, they can be approximately doubled.

The 500 V model can be driven by any type of 3 h.p. motor. Fully mobile and flexible, it is designed to operate where a fixed type conveyor would be unsuitable. It does not require level ground for operation and its degree of flexibility can be gauged from the fact that it can operate at an angle of 72 deg. turning at the same time in an arc of 25 ft. It can thus convey materials around corners, and its general versatility and flexibility make it suitable for underground mining operations.

These potentialities of the 500 V recently have been studied in Germany by officials of one of the South African mining groups. It is understood by our contemporary that possible modifications to adapt the equipment to South African mining conditions were discussed. The Stubbe's mobility arises from the wheels attached along the entire length of the unit. These wheels are placed in pairs to coincide with the 2 ft. 6 in. sections of the moulded rubber conveyor pans.

A towing bar is provided and the layout can be altered without interrupting the flow of materials. A further facet of the versatility of this machine is that it is reversible. Drive is by means of a chain and sprocket, the chain being embedded in moulded rubber to give silence and reduce wear through abrasion to the minimum. A screw tensioner is incorporated to enable the requisite chain and belt tension to be obtained.

The conveyor belt is made up of moulded sections connected to the chain with bolts and incorporating a number of trough-shaped steel stiffening plates bonded to the rubber which serve to maintain the shape of the belt. Because of the simplicity of design, maintenance can be easily carried out and it is claimed that any component section of the conveyor belt and drive can be removed and replaced within half an hour.

RETARDING MINE CARS

A simple means of retarding mine cars in track circuits where the gradients make it necessary to introduce some method of reducing the speed of cars in the circuit has been devised in the Alloa area, N.C.B.

The idea is to replace sections of the ordinary track surface with a resilient running surface, reasonably durable but sufficiently elastic to be compressed locally by the wheels of the car as it passes over them. This compression of the running surface offers a resistance to the passage of the car, and reduces the speed of the car. The length of resilient surface installed in the circuit depends on the speed reduction to be effected.

To give the best results the retarding medium consists of an upper layer of material selected for its wearing qualities and resistance to abrasion, and a lower layer, fused or moulded to this, of more resilient material. Tests are still in progress to determine the most suitable materials for the purpose.

The retarding surfaces can be provided in two forms, either bolted on to the surface of a length of rail of smaller section than the rails used in the remainder of the circuit, or as a block of material, fitted to a timber sole contained in the web of a rolled steel channel which replaces the conventional rail section. In either case the top surface of the retarding material is sufficiently proud of the surface of the adjoining rails to compensate for the compressibility of the resilient material and thus give a smooth transition of the car to the retarding section.

In order to compensate for wear, provision is made for packing pieces to be inserted under the rail or rolled steel channel to maintain the running surfaces at the correct level relative to the tops of the adjoining rails.

The Cat. 922A, rated at 80 h.p. with a standard bucket capacity of 1¼ cu. yd., is the smallest of the line of wheeled Traxcavators announced by Caterpillar Tractor Co.

TWO NEW WHEEL LOADERS

Caterpillar Tractor Co., United States, recently announced details of the 922A and 966A wheeled Traxcavators. The new machines are similar in configuration and design to the 944A introduced earlier this year. The three machines are the culmination of a 7½ years' programme of research and development. The complete range is built at Caterpillar's plant in Aurora, but will be available from Caterpillar dealers throughout the world.

Most readily recognizable feature of the 922A and 966A as in the 944A, is the bucket lift mechanism, all of which is placed ahead of the operator's compartment, while the open cockpit design ensures good visibility. Operator convenience and safety have been major factors influencing the design of the range. The power rating of the 922A is 80 h.p. and it is available with either a four-cylinder turbocharged diesel engine or a six-cylinder petrol engine.

The standard bucket on the 922A is 1¼ cu. yd. with a maximum bucket lift of 134 in. At 7 ft. bucket clearance the reach is 40¼ in. Among the attachments available for the 922A are a side dump and a light material bucket. The turning circle of the 922A is 20 ft. 3½ in. and the machine has a top speed of 20.4 m.p.h.

The power unit of the 966A is a six-cylinder turbocharged diesel engine, rated at 140 h.p. A 2½ cu. yd. bucket is standard on the 966A. Side dump, light material and quarry buckets are among the attachments available. The maximum bucket lift is 154¼ in.; at 7 ft. clearance there is a 57½ in. reach. The turning circle of the 966A is 20 ft. 9 in. Top speed for this machine is 28.6 m.p.h.

MINING MISCELLANY

It is reported from Antofagasta that the Santo Domingo copper deposit is to be exploited by the Santa Fe Mining Co., of Chile. The deposit is situated near the port of Taltal, south of Antofagasta and studies showed that some 2,000,000 tons of 3 per cent ore could be worked. A minimum investment of $2,000,000 is under consideration.

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The Australian Federal Government has been requested to assist tin producers to maintain Australian requirements by granting them total exemption from taxation. The application had the full support of the Governments of Queensland, New South Wales, Western Australia and Tasmania and the Tin Producers' Association of Australia, at whose joint request the Tasmanian Government acted as spokesman in submitting the request to the Commonwealth. Although Australia imported tin to the value of £A2,500,000 a year, it was stated, tin producers were experiencing considerable difficulties, and needed assistance to maintain present output.

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Mining rights to the old Kirkland Lake Gold property, Ontario, have been acquired by Teck-Hughes Gold Mines in a recent deal with Kirkland Minerals Corpn., for 10,000 shares of Teck-Hughes. The property comprises 11 claims covering 334.5 acres. With the mining rights are included surface rights to two sections, including the shaft site comprising 2.42 acres.

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At Tucson, U.S., the Southern Arizona Bank is using signs incorporating large amounts of copper outside the bank's main office, and these signs are also being installed at the bank's other branches. The main office sign took two days to install, covers over 350 sq. ft. on each of two faces, is 43 ft. high, and has a total weight of 3,620 lbs. External illumination is provided by neon tubing contained in copper letters. Internally the sign contains nearly 35 miles of wiring together with transformers and switches sufficient to provide 25,936 candle power, at 247,000 volts.

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Burma hopes to set up joint industrial and mining enterprises with Japanese interests, and talks have been taking place, initially through diplomatic channels, on opening up iron ore, antimony and copper mines in Burma.

★

The Mongolian Republic has established during the past three years over thirty mining and industrial enterprises, among the largest being the coal mine at Nalaikha, employing 3,600 miners, with an annual output of 600,000 tons.

★

Cleveland-Cliffs Iron Co., which operates 15 mines on Michigan's Upper Peninsula and Minnesota's Mesabi Range, plans a "severe curtailment" of operations by January, due to discouraging economic conditions. A Cleveland-Cliffs spokesman said, however, that there is still a bright long-range outlook for pelletized ores, and that the company is expanding its pellet operations and plans further expansion.

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A prospecting commission consisting of 21 Russian and ten Indonesian members, has completed studies of iron ore, coal, quartz and lime deposits in East Borneo, and plans inspection of bauxite deposits on Riouw Islands, south of Singapore. The same group will later visit Asahan, in northern Sumatra, where the Indonesian Government is planning an aluminium complex, and will also inspect, with a view to future modernization, the Umbilin coal mines in Western Sumatra.

★

The Bureau d'Investissment en Afrique has announced plans for the exploitation of the Tindouf iron ore deposits in eastern Algeria. The French iron research institute IRSID and the Institute for Ore Concentration in Stockholm are at present studying possible reduction methods for the Tindouf ores.

★

The United Arab Republic Ministry of Industry states that 100,000,000 tonnes of phosphate reserves have been located in the Western Desert in Egypt, and in the Kharga and Dachla oases. Further deposits are also reported from the Sinai peninsula. Phosphate exploitation has begun on the new site of El Hamrawein, in the Nile valley between Edfu and Esna, and work has begun on the expansion of existing phosphate workings near Kosseir.

★

The output of tungsten at the Yugoslav gold-tungsten combine in Blagojev Kamen is to be raised from 60 to 70 tonnes, by opening new workings. Further plans include a new plant, to be completed early in 1962, to process home and imported ores for an eventual production of 400 tonnes of ferro-tungsten annually, together with tungstic acid and oxygen.

★

A trade delegation, led by the chairman of the Board of Trade and Chamber of Commerce, has left Thailand for Europe seeking new markets for mineral ores and other products.

★

According to a recent report in *Pravda*, gold production in eastern and northern Siberia has been extended considerably over the past ten months. The Soviet Government has announced production increases in the Aldan River area in the south of Yakutia, in the Ust-Maya district of south-eastern Yakutia and in the Oimyakonsk polar region; gold workers in these areas received special bonuses.

★

The Israeli authorities are asking for tenders for the construction of a 50 km. dyke during 1961 to fence off about one-tenth of the total Dead Sea area for new evaporation pans to expand Israel's potash production, as the first part of a four-year stage of the development programme undertaken by the Dead Sea Works. The intended Dead Sea dyke, which will cost about I.£40,000,000, will cut across the sea some 500 m. west of the International Boundary. The dyke is planned to be 8 m. high, and up to 72 m. broad at the base, and over 10,000,000 cu. m. of earth will be dumped into the sea for its foundations. The I.£100,000,000 programme of the Dead Sea Works is intended to quadruple annual production to some 600,000 tonnes of potash and 10,000 tonnes of bromine by the mid sixties. The product will be refined by a heat process, which should increase the purity of the final product to 98.5 per cent.

★

The Pakistan Government is to invest Rs. 320,000,000 in power production and mining within the second Five-Year Plan. This excludes a further Rs. 240,000,000 set aside for promotion of the country's mineral oil industry. The whole is part of a sum of Rs. 2,200,000,000 to be spent on total industrial development during this period.

★

The Tasmanian State Government, in conjunction with Rio Tinto Ltd., is continuing the exploration by drilling of the Savage River iron ore deposits in rugged country in the north-west of Tasmania. It is hoped to prove some 100,000,000 tons of ore, which would form the basis of a state-owned steel enterprise. It is believed that the average grade of ore will approximate 45 per cent iron, and that beneficiation will be necessary to give a satisfactory smelting grade. The proving of the deposit is expected to take two years.

★

Following on the conference on nuclear power, sponsored by the Ontario Government earlier this year, it was decided to form an organization to represent all bodies concerned with the nuclear field in Canada. The Canadian Nuclear Association has now been formed, and its directors have invited participation from all organizations and individuals who are, or expect to be, engaged in some phase of development or utilization of nuclear energy. It will aim at presenting the views of its members to government on all phases of future developments in the peaceful uses of nuclear energy. Its services will include studies of technical problems, professional and technical manpower requirements, legislation and insurance problems; public and industrial education, and publications on development and opportunities, both in Canada and elsewhere. The Association's address is Box 475, Adelaide St. Postal Station, Toronto, Ont., Canada.

★

The official opening of the "Focus" sinter plant at Workington Iron and Steel Co. by His Royal Highness, Crown Prince Harald of Norway emphasizes the link between Norway and Britain in the steel industry. The steel which is processed at the new works will largely come from the Sydvaranger Co.'s ore plant at Kirkenes. The new single-strand continuous sinter plant is designed to produce 12,500 tons of self-fluxing sinter per week for use in the company's blast furnaces. It has taken almost two years to build, and has cost £2,500,000.

Metals and Minerals

Expansion of Japan's Metal Industries

Japan has been enjoying unprecedented prosperity, a situation which reflected in rising mineral imports, increased production of metals and ferro-alloys, and in ambitious programmes of expansion. Hardly a week passes without further news of Japan's search for mineral supplies and of the participation of Japanese companies in mining projects in other Eastern countries or in Australia, Africa, and North and South America. A number of important developments in the Japanese metal industries have been noted in this column during the course of the year.

Estimates issued in Tokyo show that over the current year it is expected that 137,500 tonnes of aluminium will be produced in Japan, almost all of which will be consumed by domestic mills, fabricators and other users. In the first three-quarters of 1960 more than 25,000 tons of aluminium were imported, mainly from North America. Some 1,050,000 tonnes of bauxite will have been consumed by Japanese aluminium producers over the year. Furthermore, it is now anticipated that by 1980 Japan will have an annual aluminium production capacity of 720,000 tonnes. This is some five times the 1959 production, which itself at 102,276 tonnes was considerably in excess of the earlier estimate of 98,000 tonnes.

Three producers—Nippon Light Metal, Showa Denko and Sumitomo Chemical—at present account for 80 per cent of the total national aluminium capacity. Some 106,000 tonnes of aluminium annually will be the new production capacity of Showa Denko from the start of 1963, when this company plans to open a new aluminium smelter at Chiba in Japan. The Chiba smelter will have an annual output of 60,000 tonnes of primary aluminium. Existing capacity comprises 35,000 tonnes at the company's Kitakata plant and 11,000 tonnes at the Nagano unit.

In view of the far-reaching plans for the development of North Queensland's bauxite resources (see our last week's issue), it is interesting to note that three trial shipments of bauxite from the Weipa field are to be shipped to Japanese smelters early in 1961. An announcement by the Commonwealth Aluminium Corporation (Pty.) Ltd. (Comalco) states that loading could begin after the monsoon season and temporary facilities are being set up for the purpose. A deep entry channel for the new port at Weipa is to be started in 1961.

The magnesium industry has also been going ahead. Demand continues to rise and production for the first nine months of 1960 totalled 4,205 s.tons compared with 3,625 s.tons in the corresponding period of 1959.

In the second quarter of the current financial year (July-September), Japanese ferro-alloy makers exported 945 tonnes of high-carbon, 3,734 tonnes of low-carbon, and 80 tonnes of medium-carbon ferrochrome, states a recent announcement by the Japan Ferro-Alloy Manufacturers' Association. This compares with 179 tonnes of high-carbon and 3,113 tonnes of low-carbon ferro-chrome shipped in the previous quarter. In October, however, Japan's production of chromium products fell to 7,305 tonnes, representing a decline of 9.6 per cent from the previous month. The Association attributes the decline to the fact that the electric power supply had become tighter during the dry season.

Nippon Kokan Kaisha, a leading Japanese steel mill and Japan's largest ferro-alloy manufacturer, plans to expand the ferro-chrome producing facilities at its plant in Toyama, northern Japan, in an attempt to meet the growing demands from domestic and export customers. The company believes that the additional facilities could start operations next year and would contribute to an increase of between 20 and 30 per cent in its output of ferro-chrome. Present production capacity of the plant is 23,000 tons of low-carbon ferro-chrome and 4,000 tons of high-carbon ferro-chrome annually.

Japan's export shipments of manganese products in the second quarter of the financial year included 9,032 tonnes of high-carbon, 1,970 tonnes of medium-carbon and 1,767 tonnes of low-carbon ferro-manganese, as well as 424 tonnes of silico-manganese and 784 tonnes of metallic manganese. First quarter exports comprised 7,859 tonnes of high-carbon, 2,427 tonnes of medium-carbon and 721 tonnes of low-carbon ferro-manganese, together with 712 tonnes of silico-manganese and 659 tonnes of metallic manganese. Production of manganese products during October at 20,556 tonnes showed almost a 10 per cent decrease from the revised output of 22,038 tonnes in September, again due to the tighter power supply situation.

The South Korean Government has announced that the state-owned Korean Tungsten Co. will be permitted to export tungsten ore to Japan in January, 1961, for the first time in ten years. Dr. Syngman Rhee, the former President, banned tungsten exports to Japan. The company expects to export about 1,900 tonnes of tungsten concentrate to Japan in 1961, the value being placed at about $U.S.1,660,000.

LONDON METAL AND ORE PRICES, DEC. 8, 1960

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £200 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 252s. 7d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram.
Magnesium, 2s. 2¼d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28½/£28¾
Quicksilver, £70½ ex-warehouse
Rhodium, £43/£45 oz
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79½d. f. oz. spot and 79¼d. f'd.
Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	21s. 6d./22s. 6d per unit c.i.f.
Beryl (min. 10 per cent BeO)	240s./245s. per l. ton unit BeO
Bismuth	30% 5s. 0d. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
,, Hard Lumpy 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
,, Refractory 40%	£11 0s. 0d. per ton c.i.f.
,, Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio : 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) Nb_2O_5 : Ta_2O_5	175s./176s. per l. ton unit c.i f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 60s. 0d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£28 0s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	148s. 0d./153s. 0d. per unit c.i.f
Vanadium—	
Fused oxide 95% V_2O_5	7s. 6d./8s. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2	£16/£16 10s. ton c.i.f

BAUXITE IN JAMAICA

Alcoa is to spend about $U.S.15,000,000 on construction and development work in Jamaica before the actual start of bauxite operations. The expenditure will be at Rocky Point, south of the mouth of Salt River at Clarendon, where a bauxite plant and a port are to be built. Construction plans are stated to be in the final stages of consideration, in both Jamaica and the U.S., and it is hoped that work on the port can be started in the early part of the new year. Bauxite will be shipped from the new port to Alcoa's plant at Point Comfort, Texas, U.S.

Alcoa will be the fourth company to start mining bauxite in Jamaica. The other are Reynolds Jamaica Mines, Alumina Jamaica Ltd., and Kaiser Bauxite. A recent announcement from Kingston states that Kaiser Bauxite, the island's largest bauxite producer,

is to cut back its output for the next four months by approximately 30 per cent of its average monthly output for 1960.

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A Bill to ratify the sale of the Australian aluminium plant at Bell Bay, Tasmania, has been introduced in the Senate by the Minister for National Development, Senator Spooner. The Federal Government, which has contributed £A.9,700,000 to the capital cost of the Bell Bay plant, is selling its interests for almost £A.11,000,000. A new controlling company, Aluminium Production Corporation, has been registered with the Supreme Court of Tasmania, and will have a nominal capital of £A.10,000,000. The Tasmanian Government will be associated in the new company with the Consolidated Zinc Corporation, which bought the Federal Government's interest in the Australian Aluminium Commission. The Tasmanian Government, which contributed £A.1,500,000 to the cost of the original plant, will hold one-third of the shares. In due course the holding of Consolidated Zinc will form part of the joint association between that company and Kaiser Aluminium.

LARGE MOLYBDENITE FIND

Molybdenum Corp. of America has announced the discovery of a large molybdenum deposit in the Red River mining district of Taos County, north central New Mexico. Exploration started in 1954 and for the past three years it has been carried on with financial assistance from the Defence Minerals Exploration Administration.

Mr. Marx Hirsch, president of Molybdenum Corp., has described the find as being of major significance. The company's final report to the government agency disclosed the existence of about 130,000 s.tons of ore containing about 5 lb. of MoS_2 a ton, equivalent to approximately 380,000 s.tons of molybdenum metal. Since June 30, further exploration has disclosed additional zones of higher mineral content. No decision will be made regarding possible mining operations until the conclusion of the exploratory work in the enriched area. The company has a 50-ton mill at the property, which could be expanded to 200 t.p.d. by additional crushing capacity. To mine and mill economically an orebody of the indicated magnitude, would necessitate heavy capital outlay.

For its supplies of molybdenum the Free World has hitherto been dependent primarily on the American Metal Climax mine in Colorado, and to a much smaller extent on by-production from copper mining. American Metal Climax has proved reserves totalling more than 450,000,000 tons containing over 1,000,000 tons of recoverable molybdenum. Mine production is currently at a rate of 33,000 tons a day. This year the company expects to produce about 25,000 s.tons of molybdenum, but output could be raised by a further 10 or 15 per cent with existing mining and processing facilities. It is estimated that about 8,000 s.tons of molybdenum will be recovered in the U.S. this year as a by-product of copper mining, mainly by Kennecott. Molybdenum is also a by-product of operations at the El Teniente and Chuquicamata copper mines in Chile. Canada ranks third in the list of world producers and Norway fourth. In 1959 Free World consumption of molybdenum was about 30,000 s.tons.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

During the last week there has been no definite trend in metal prices as a whole as in the copper and zinc markets prices have tended to rise, whereas in the tin market prices have receded and in the case of the lead price there has been very little change.

COPPER'S WIDENING BACKWARDATION

The copper market in London has maintained its firm undertone and quotations have risen with a further widening of the backwardation. This latter trend is expected to continue until the Christmas holidays, but at the present general price level this may not give rise to further upward movement in the market as a whole. The continuous increase in stocks in official warehouses was halted this week, when on balance 212 tons were removed, reducing the total figure to 12,705 tons. This tendency may continue unless some American smelters ship metal to this country, which is just possible if the desire to sell metal is sufficiently strong.

In Europe demand for copper remains good, but buyers are showing signs of only covering in their requirements on those days when the London market shows a decline. The British Bureau of Non-ferrous Metals Statistics reports that in October the U.K. consumption of copper in all forms totalled 62,372 tons against 65,748 tons in September, and it is the general opinion that there has been a further slight decline during November. In the United States there has been a slight firming up in the customs smelter intake price for No. 2 scrap to 24 c. per lb. Apart from this, all reports are of a pessimistic nature and the time for the beginning of the recovery is being set further and further into the new year. In Chile negotiations for the new contract at El Teniente are proceeding but there has been no news of developments. In Africa the political situation is still uncertain, but so far supplies of copper from Katanga have not been curtailed and the situation on the Rhodesian Copperbelt is calm.

TIN SLIGHTLY LOWER

The tin market has trended slightly lower following Eastern advices where the turnover remains at a fairly high figure. The backwardation on the London market continues, although at the beginning of the week official stocks were 55 tons higher at 9,186 tons. The International Tin Council met in Rome at the beginning of this week.

World demand for tin remains reasonable and the U.K. consumption during October amounted to 1,951 tons as compared with 1,983 tons in September, according to the latest figures issued by the British Bureau. Shipments of tin from Penang during November showed an increase over the October figure, the respective tonnages being 7,371 tons and 6,937 tons; the destinations of the metal shipped showed no departure from the normal pattern.

The communique issued by the International Tin Council after its meeting in Rome, confirmed the general expectation that the freedom of export is to be continued for another quarter. The Council also released a statement which effectively disposes of certain rumours of quantities of tin being offered for sale in South-east Asia, reputedly with the official authority of the Indonesian Government which, however, has categorically denied that it had any knowledge of, or was in any way concerned with, such offerings. The Indonesian delegation stated also that, while some tin metal in Indonesia might be in private hands, the quantity involved was bound to be very small.

On Thursday the Eastern price was equivalent to £798½ per ton c.i.f. Europe.

ZINC FIRMER—LEAD LITTLE CHANGED

The lead market has remained stable and the zinc market has developed a firmer undertone following one or two days of weakness. The supplies of lead still remain plentiful and although some producers are not offering freely, buyers have no difficulty in covering their requirements. The British Bureau gives the lead consumption in the U.K. for October as 32,680 tons compared with 34,274 tons in September, whilst from the Continent lead production in the O.E.E.C. countries for October is given as 68,840 tonnes as compared with 60,420 in September. Stocks at the end of October, however, showed a decline at 59,435 tonnes as compared with 63,027 tonnes at the end of September.

The statistical position for zinc showed a similar picture, with British consumption for October totalling 30,598 tonnes as compared with 33,284 tonnes in September and O.E.E.C. production totalling 74,267 tonnes in October as against 72,167 tonnes in September. Stocks of refined zinc at the end of October totalled 50,714 tonnes as compared with 53,386 tonnes at the end of September. The dominating influence in both these markets is still the state of the motor car industry and here little of an encouraging nature has been reported.

Closing prices are as follows:

	December 1 *Buyers*	*Sellers*	December 8 *Buyers*	*Sellers*
COPPER				
Cash	£231¾	£232	£234½	£234¾
Three months	£228½	£228¾	£231¼	£231½
Settlement	£232		£234¾	
Week's turnover	11,075 tons		10,800 tons	
LEAD				
Current ½ month	£66¼	£66¼	£66	£66⅛
Three months	£67⅛	£68	£67⅛	£67¼
Week's turnover	7,125 tons		7,750 tons	
TIN				
Cash	£799½	£800	£798	£798½
Three months	£797½	£798½	£795½	£796
Settlement	£800		£798½	
Week's turnover	420 tons		560 tons	
ZINC				
Current ½ month	£86	£86⅛	£86⅛	£87
Three months	£85¾	£85¾	£86	£86⅛
Week's turnover	6,325 tons		5,075 tons	

Mining Finance

Mr. Joel Faces Africa's Problems

Mr. H. J. Joel, chairman of the Johannesburg Consolidated Investment company, has gone to a lot of trouble in his annual statement this year to face the many and varied problems that currently befog investment in Africa whether it be in mining or industry. By far the greater proportion of "Johnnies" investments is in companies which either operate in Africa or are directly dependent on such operations. About two-thirds of its investment income is currently drawn from the diamond, copper and platinum industries there. The African future is thus of vital interest to both "Johnnies" and its shareholders.

Factors affecting investment confidence are, Mr. Joel says, concern about the safety of the capital employed, doubts about the ability of African companies to maintain their earnings or misgivings about the fiscal policy of local governments. His opinions on these matters may, briefly, be summed up as follows. Mr. Joel considers that in the Union and the Rhodesias, where the bulk of "Johnnies" interests lies, capital is "comparatively safe from the major risk of expropriation and from undue control on the movements of funds".

The costs of mining in Africa are bound to be added to by advancing wages for the African labour forces, but Mr. Joel thinks that as a result there will be better utilisation of these forces and that this "will go far to offset the increasing cost of labour". There is also the very important question, however, as to whether labour conditions will improve sufficiently quickly to avoid difficulties arising with consequent interruptions of production. Mr. Joel considers that the answer to this is definitely no. He says that improvements of this kind elsewhere have not escaped such difficulties and he thinks that Southern Africa will have the same experience. But any such interruptions should not critically affect production over significantly long periods, anyway so far as the Union is concerned.

It is only about the fears of higher taxation that Mr. Joel has to admit that "it is not at present possible to foretell whether these fears are justified nor to make any satisfactory assessment of the risk involved in the various areas where our interests lie".

There is, admittedly, good reason why "Johnnies" should endeavour to view the future of Southern Africa with some confidence, but the directors are certainly not entirely alone in their opinion that the substantial rewards obtainable from investment in Africa "outweigh the potential risks as we now see them".

Apart from all these matters, the chairman regards the outlook for "Johnnies" investments as generally speaking sound and, in the absence of any major disturebancs in the immediate future, he forecasts a dividend income for the current year to next June "somewhat greater" than that for 1959-60. On the dividend of 5s. for that year, the £1 shares at 52s. 6d. offer a yield of 9.5 per cent. This is a return which, on an investment of this calibre, appears to make ample allowance for the uncertainties inherent in the African situation.

Extracts from Mr. Joel's address are on page 667

LONDON MARKET HIGHLIGHTS

A rather better feeling emerged in the South African gold share market this week. Selling almost completely dried up and was replaced by a modest but persistent demand. Johannesburg as usual provided the bulk of the orders—some of which were thought to have originated from U.S. sources—but there was also a reasonable amount of London interest. A number of the inquiries were for the marginal mines and showed that gold price hopes still linger despite the lack of fresh excitement in the London bullion market.

There was also some interest in the uranium producers. This was thought to have little connection with the current talk of a stretch-out plan for the C.D.A. which are due to expire in the middle 1960s; a more likely reason for the interest was the approach of the December dividend season, the relatively large amount of dividend in prices making these stocks attractive to Cape buyers who suffer no tax deduction on dividends.

Among the older golds, Geduld Proprietary (65s.), Marievale (28s. 6d.) and Grootvlei (21s. 6d.) were consistently firm. Uraniums to move ahead included Randfontein (18s. 3d.) and West Rand Consolidated (20s.).

Newer mines were quietly firm, although the generally excellent November profits made little share market impression. Hartebeest, however, recovered 1s. 3d. to 48s. 9d. following the sharply higher milling rate and profit last month. Western Holdings recovered from some momentary weakness on Monday morning caused by reported speculative selling in Johannesburg to show a net gain on the three days of 3s. 1½d. to 156s. 10½d. President Steyn were another firm spot, a rise of 10½d. to 22s. 3d. greeting news of the high value borehole deflection in the unexploited south-eastern area of the property.

Feature of the finance group was again the persistent demand for Rand Selection. The shares climbed from 58s. 1½d. to 62s. 6d. at one time on further talk of pending developments in the company's future. Anglo American moved up 3s. 9d. to 157s. 6d. in sympathy with the generally better market feeling and "Johnnies" (53s. 3d.) were helped by the chairman's review of African mining prospects and forecast of higher income in the current year.

With so many hopes and fears being aroused by the current Federal Review Conference, the Rhodesian copper share market was left alone and prices where changed tended to be easier. Nchanga came back to 46s. 10½d. pending the interim dividend announcement.

Tins remained generally dull, prices losing a few pence on each successive day. Some bear selling in Singapore was partly held to blame for the trend which lowered Ayer Hitam 9d. to 20s. 6d., and Tronoh 1s. to 33s. 9d. Southern Kinta, however, resisted with a rise of 9d. to 26s. 6d. on consideration of the high yield on the shares and the recently increased interim dividend.

Otherwise, Consolidated Zinc steadily eased back to 62s. 6d., shares apparently having not yet recovered from the bout of profit-taking that followed news of the recent Australian bauxite plans.

As we go to press we learn that the Bank Rate has been reduced to 5%.

THE FIRST OF THE KAFFIR DIVIDENDS

Wednesday's opening of the South African gold mining dividend season for the half-year to Christmas, 1960, was attended by no surprises. The one that might have been, that of Hartebeestfontein, the Klerksdorp area gold and uranium producer in the Anglo-Transvaal group, had already been well foreshadowed as reported here last week. Similarly, the small cut in the payment by the adjoining Buffelsfontein, a member of the General Mining group, had been officially forecast (*M.J.* November 25). The dividends are shown in the following table together with those for the three preceding half-years.

The declaration to cause most market comment was that of Consolidated Murchison the Anglo-Vaal group antimony producer. It brought the total distribution for the year up to 7s. 9d., a cut of 6d. compared with 1959, although the accompanying preliminary 1960 profit announcement showed that profits are actually slightly higher at £522,400 against £505,755 in the previous year and that the net surplus after tax comes out at £368,400 compared with £354,356. These figures show two things. First, the directors have been unusually cautious in their dividend policy. Second, there must have been a rise in the gross profit from the current quarter's operations to around £190,000 compared with £106,280 in the September quarter and with only £87,756 in the June period.

Middle Witwatersrand (Western Areas) also announces its 1960 profit. At £533,000 it is nearly £5,000 higher than that for 1959.

Before leaving the subject of the Kaffir dividends it is worth noting that South African domiciled shareholders will for the first time be receiving their payments in the new decimal currency that comes into being there on February 14, the payment date being February 16. This will not make any difference to U.K. holders, of course, who will still get their dividends in the usual shillings and pence.

Next year, however, all investors interested in South African investments will have to get used to the new currency out there. It is a simple one. The new basic unit, a rand, equals 10s. It is dividend into 100 cents, so the present 1s. will be equivalent to 10 cents and 6d. to 5 cents. It is only with the penny that complications are reached. A penny equals approximately 0.833 cents.

	June 1959	*Dec.* 1959	*June* 1960	*Dec.* 1960
	s. d.	s. d.	s. d.	s. d.
Buffels	1 6	1 9	1 10½	1 9
Cons. Murchison	2 9	5 6	3 6	4 3
E. Rand Ext.	9	1 0	9	1 0
Hartebeest	3 6	3 0	3 0	2 6
Middle Wit.	7½	7½	7½	7½
New Pioneer	2 9*	1 3	1 9	1 3
S. Roodepoort	1 1½	1 1½	1 1½	1 1½
S. Van Ryn	—	7	—	7
Stilfontein	1 10½	1 7½	1 6	1 6
West Rand Cons.	2 0	2 3	2 0	2 3

* For whole year to June 30, 1959.

(*Continued overleaf*)

Rand and Orange Free State Returns for November

GOLD OUTPUT AND PROFIT

Company	November 1960 Tons (000)	Yield (oz.)	Profit† (£000)	Year ends	Current Financial Year Total to date Tons (000)	Yield (oz.)	Profit† (£000)	Last Financial Year Total to date Tons (000)	Yield (oz.)	Profit† (£000)
Gold Fields										
Doornfontein	105	43,297	233·9	J	525	215,823	1146·3	474	192,463	952·1
Libanon	117	27,999	72·2	J	585	139,819	350·1	553	129,935	310·0
Luipaards Vlei	68	11,863	6·4	J	340	59,571	26·1	360	63,647	28·7
Rietfontein	14	3,400	1·2	D	170	44,058	58·5	176	46,663	83·6
Robinson	45	10,253	7·0	D	494	109,609	18·9	636	131,812	L81·6
Simmer & Jack	72	12,731	0·1	D	829	147,259	L37·5	933	178,630	L37·8
Sub Nigel	66	15,046	16·8	J	332	75,821	80·5	332	78,585	104·2
Venterspost	122	34,032	80·4	J	618	172,473	399·8	634	159,760	306·6
Vlakfontein	51	18,561	91·4	D	567	204,145	972·8	560	200,640	950·2
Vogels	84	17,648	20·6	D	939	201,234	225·9	1,004	223,946	380·8
West Drie	130	121,547	1099·6	J	650	614,948	5452·5	515	471,275	3949·9
Anglo American										
Brakpan	142	17,603	16·2	D	1,574	191,046	145·7	1,529	185,384	126·8
Daggas	220	44,709	224·5	D	2,528	511,248	2495·6	2,631	529,496	2587·2
East Daggas	108	18,362	45·8	D	1,166	197,966	458·6	1,108	185,726	378·5
F.S. Geduld	95	82,173	674·5	S	190	164,331	1349·1	187	157,930	1250·8
President Brand	118	94,503	835·5	S	237	189,309	1676·8	232	191,151	1691·1
President Steyn	108	40,229	177·2	S	213	79,322	349·6	208	82,477	393·8
S.A. Lands	100	20,751	52·9	D	1,076	223,447	512·4	1,062	221,800	620·8
Springs	95	12,942	15·8	D	1,102	152,829	157·4	1,046	157,069	146·0
Vaal Reefs	101	46,966	260·6	D	1,093	495,418	2621·0	995	449,088	2374·1
Welkom	99	31,641	80·3	S	198	63,173	161·3	196	61,910	157·7
Western Holdings	155	105,662	909·7	S	312	211,634	1818·7	274	176,138	1411·1
West. Reefs Ex.	135	38,813	127·6	D	1,528	432,701	1433·3	1,448	381,582	1160·8
Central Mining										
Blyvoor	135	87,548	680·6	J	674	437,517	3343·2	647	424,011	3213·5
City Deep	117	24,185	4·6	D	1,265	258,691	58·1	1,256	261,690	102·8
Cons. M.R.	48	10,763	4·3	J	274	56,765	20·4	485	90,105	38·6
Crown	184	33,075	5·1	D	2,188	372,621	68·8	2,419	385,595	154·0
D. Roodepoort	185	33,796	50·1	D	2,116	386,946	552·8	2,110	389,263	588·2
East Rand Prop.	216	50,265	77·9	D	2,446	591,127	905·9	2,422	630,421	1294·2
Harmony	170	68,941	326·9	J	840	339,356	1596·7	702	278,359	1258·1
Modder East	120	11,535	0·7	J	637	61,995	0·6	696	67,379	13·4
Rose Deep	25	4,280	2·7	D	269	47,197	12·0	409	57,215	23·5
J.C.I.*										
Freddies Cons.	60	12,628	L35·0	D	668	146,072	L422·2	654	156,936	L406·3
Govt. G.M.A.	53	10,275	0·0	D	580	117,598	5·2	584	117,731	L10·9
Randfontein	13	1,910	0·5	D	243	47,062	27·3	387	66,611	89·2
Union Corporation										
East Geduld	125	36,250	230·1	D	1,444	421,909	2698·6	1,521	454,693	3063·3
Geduld Prop.	78	13,166	32·6	D	830	143,812	281·6	807	152,339	323·4
Grootvlei	225	46,578	253·5	D	2,405	499,693	2590·8	2,345	494,419	2570·3
Marievale	98	24,059	132·1	D	1,085	265,612	1400·6	1,041	255,249	1260·5
St. Helena	178	61,853	406·9	D	1,832	625,182	3927·7	1,660	509,314	2835·2
Van Dyk	75	11,476	8·2	D	812	132,127	95·3	822	154,340	302·1
Winkelhaak	95	32,200	186·6	D	973	313,315	1578·6	829	212,194	501·4
General Mining										
Buffelsfontein	148	61,054	341·7	J	737	303,658	1663·3	722	275,611	1444·0
Ellaton	26	6,191	21·7	D	309	73,178	268·6	340	79,163	316·1
S. Roodepoort	30	7,172	24·0	J	152	36,346	118·5	150	35,640	114·4
Stilfontein	168	76,395	431·5	D	1,790	809,261	4340·1	1,594	758,855	4499·7
W. Rand Cons.	130	18,975	9·6	D	1,458	210,290	101·1	1,513	218,488	193·2
Anglo Transvaal										
Hartebeestfontein	125	58,127	344·2	J	603	280,695	1628·0	476	247,415	1574·7
Loraine	82	17,917	L13·1	S	164	35,831	L25·9	162	32,600	L36·6
N. Klerksdorp	10	1,011	L7·9	D	120	13,043	L63·3	113	12,559	L90·2
Rand Leases	184	26,312	4·8	J	948	136,144	42·3	970	143,453	143·6
Village M.R.	28	4,018	L4·8	J	147	21,157	L20·0	150	23,410	4·7
Virginia O.F.S.	140	29,981	2·9	J	591	125,411	L129·7	658	153,637	74·0
Others										
N. Kleinfontein	78	10,288	3·0	D	868	112,012	9·9	910	118,056	33·9
Wit. Nigel	20	4,435	5·9	J	100	22,170	27·2	92	21,910	26·1

Gold has been valued at 253s. 10d. (October 254s. 0d.). per oz. fine. L indicates loss. † Working Profit. * Working Profit includes sundry revenue. Tables exclude profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Luipaards Vlei, Randfontein and W. Rand Consolidated.

ESTIMATED URANIUM REVENUE

Company	Year ends	Nov. Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)
Goldfields				
Doornfontein	J	15·0	75·0	73·0
Luipaards Vlei (*a*)	J	90·0	450·0	467·0
Vogels	D	53·0	592·0	579·0
West Drie	J	49·0	245·0	250·0
Anglo American				
Daggafontein	D	141·6	1547·6	1521·9
P. Brand	S	43·0	85·2	90·8
P. Steyn	S	60·0	117·6	119·7
Vaal Reefs	D	140·5	1556·6	1576·3
Welkom	S	57·0	111·8	113·8
West Reefs Ex.	D	159·3	1778·0	1751·5
Central Mining				
Blyvoor	J	160·0	806·0	767·4
Harmony	J	255·0	1268·8	974·9
J.C.I.				
E. Champ d'Or (*b*)	D	6·2*	73·4*	75·5*
Freddies Cons.	D	40·0*	364·0*	388·0*
Govt. G.M.A.	D	23·0*	253·4*	244·6*
Randfontein (*a*)	D	100·9*	1148·4*	1178·5*
General Mining				
Buffelsfontein	J	209·0	1056·0	1059·0
Ellaton	D	17·0	185·0	197·0
Stilfontein	D	87·0	973·0	947·0
W. Rand Cons. (*a*)	D	206·5	2277·8	2232·3
Anglo Transvaal				
Hartebeestfontein	J	244·0	1229·0	1312·6
Loraine	S	33·0	68·0	73·0
N. Klerksdorp	D	11·5	115·5	120·5
Virginia O.F.S.	J	181·5	870·2	887·8

Tables include profit from uranium acid and pyrite before loan redemption. (*a*) Total profit from uranium section. (*b*) Overall profit. * Net revenue after provision for loan redemption.

MINING FINANCE—*Continued*

NOVEMBER GOLD RETURNS

Although the pattern of dividend payments is unlikely to be immediately affected, it is nevertheless encouraging that the windfall from the premium price of gold, which in October with gold declared at 254s. an ounce amounted to approximately £350,000 for the industry as a whole, was not appreciably less for November with a declared price of 253s. 10d.

Moreover it appears likely that the volume of gold sales from the Bank of England may for some time be aimed at keeping the premium at about this level which appears in practice to be just high enough to discourage central banks from converting their dollar holdings into gold on the London market. It is possible that this shielding operation for the dollar, which the Bank is believed to be conducting in collaboration with Washington, will continue for some months. On the other hand as it is essentially a windfall of unpredictable duration, it scarcely provides a basis on which mines can recalculate their pay limits and it is notable that mines such as Holdings, Saints, and Winkels, have all recorded peak gold profits in November on unchanged mill rates while Hartebeest, with an increase of 7,000 tons throughput, reports a profit increase of nearly £20,000.

There have, however, been some profit declines on some of the older Central Rand mines linked to lower mill throughput, which may reflect a normal seasonal decline in labour complements.

SOUTH WEST AFRICA COMPANY CUTS LOSS

The South West Africa company, owned as to around 90 per cent by Gold Fields, Anglo American and the British South Africa company, continues to find it difficult to make money out of its base-metal operations in South West Africa. It has been out of the dividend list since 1955. In the year to June 30 last a loss of £4,609 was made, after putting £102,264 to depreciation of fixed assets, which is appreciably less than in 1958-59 when the loss was £63,897 after depreciation of £117,478. The carry-forward has been reduced by rather less than £5,000 to £190,783.

The chairman, Mr. A. R. O. Williams of the Gold Fields group, says that, although revenue increased by some £278,000, the expansion in the company's productive operations resulted in a £223,000 rise in expenses. Dividend income from the company's holding in Tsumeb Corporation fell by £12,000 to £99,750.

Production by S.W.A. during the year was 8,502 short tons of lead vanadates, 198 short tons of zinc sulphides, 199 short tons of tin-wolfram and 6,065 short tons of salt. Mr. Williams is able to detail one or two developments which should help current year's operations, but he does not venture any views about profitability or otherwise in 1960-61. Perhaps he will be able to give minority shareholders a little more guidance in this respect at the meeting in London on December 29.

In 1957 the present controlling companies bid £5 a share in cash for the 13s. 4d. shares in S.W.A. equal to 25s. for the present 3s. 4d. shares quoted in the market at around 10s. They made the bid in order to prevent S.W.A. being taken over by the American controlled Tsumeb Corporation.

GROWING INTEREST IN LAMPA

Lampa Mining, a company with its head office in Liverpool which produces silver and copper from a mine in Peru, had a

good year in 1959-60, one which led to a total distribution of 30 per cent on the 1s. units, a record in the company's history, although in the jubilee year of 1956 there was a payment of 40 per cent. But this was on an issued capital that has since been doubled.

The chairman, Mr. G. L. Carroll, is quite frank about the fact that 10 per cent of the latest distribution was in the form of a bonus. He regards 1959-60 as having been "of rather an exceptional nature" and suggests that shareholders should look upon the bonus "as being in the nature of a windfall".

There are two reasons for this caution. The price of copper has fallen. Production costs have risen. So less favourable results are expected for the current year. Having said this Mr. Carroll ends on something of an optimistic note. The company is working steadily at a reasonable profit and is looking forward to further increases in production which should counteract to some extent the rise in costs.

Lampa 1s. units are quoted in London at 2s. 10½d. at which price they return just on 7 per cent if the 1959-60 bonus is ignored. The units have been in demand recently on a growing theory that next year may see a materially better price for silver. They give a reasonable enough yield to make them something more than a gamble for any ardent followers of this theory.

Lampa proposes also to make a capitalization issue of three fully-paid shares for every seven units held.

SOME RECENT REEF INTERSECTIONS

President Steyn reports a further deflection in borehole K.P.11 in which the Basal reef was intersected at 6,701 ft. and assayed 153.3 dwt. over 9.85 inches, equivalent to 1,510 inch-dwts. Core recovery was complete and there will be no further deflections. Taken in conjunction with the result from the previous deflection prospects for this portion of the property have been enhanced.

President Brand reports that borehole S.P.7 situated 6,900 ft. due south of the No. 2 sub vertical shaft has intersected the Basal reef at 5,849 ft. with poor results equivalent to 41 inch-dwt. A deflection is being made.

Leslie Gold Mines announces the intersection of the Kimberley reef at the No. 1 shaft at 1,487 ft. below collar. Sampling around the perimeter gave 16.5 dwts. over 13.6 inches, equivalent to 224 inch dwts

BROKEN HILL SOUTH'S ORE RESERVES

There is steady shrinkage in the ore reserves of this important mine, and its subsidiary company, Barrier Central, which is working the old Proprietary and Central mines leases. The company has a very solid investment position, but the future of mining will depend upon the discovery of new ore. Exploration is being carried on actively in the company's leases and adjoining areas, on the western side, where an extensive mineralized zone exists.

A permit has been granted for testing of the mineralized formation, to be carried out under the City of Broken Hill. There are two folded zones; in the upper zone, some 3,279 ft. of driving has been done on the 1,480 ft. level where some minor ore development has been exposed. The lower zone has a large fold structure, and it is considered that this holds good possibilities

(Continued overleaf)

JOHANNESBURG CONSOLIDATED INVESTMENT COMPANY

(Incorporated in the Union of South Africa)

EXTRACT FROM MR. H. J. JOEL'S SPEECH

The annual general meeting of Johannesburg Consolidated Investment Company, Limited was held on December 6 in Johannesburg.

Mr. H. J. Joel, the chairman, presided and, in the course of his speech, said :

For the year ended June 30, 1960, the profit, before tax, of your company and its wholly owned subsidiary, Barnato Brothers Limited, amounted to £2,568,160, an increase of £527,244 over the comparable figure for the previous year. This satisfactory result arose mainly from an improvement in our dividend income, the greater part of which was accounted for by our diamond, copper and platinum interests.

Depreciation of the book value of investments resulted in a drop of approximately £350,000 in the charge for Taxation.

The net profit after tax was £2,099,653. The transfer to Investment Reserve amounted to £603,903 and, in addition, the General Reserve was increased by £600,000. The dividend was increased from 4/6d. to 5/- per share, while the carry forward of £240,639 remained virtually unchanged.

During the financial year there was a general decline in the market value of shares in companies operating in Southern Africa.

The book value of most of our investments is well below market value and was therefore not affected by this decline.

This general fall naturally affected the market value of our quoted securities, but it was largely offset by the acquisition of new investments during the year, certain of which, notably Western Areas Gold Mining Company Limited, had appreciated above cost by June 30, 1960.

The market for diamonds is at present satisfactory and the demand for platinum although quiet remains steady. World production of copper is at the present time in excess of consumption and various producers have instituted cuts in output or sales in an effort to correct this position. In my opinion, the fact that there arises from time to time an excess capacity to produce copper is not one which need cause undue alarm or surprise.

It is well recognized by producers that consumption must not outstrip production for any length of time and, as a result of plans made to avoid this situation, it is almost inevitable that periodically excess productive capacity should emerge. This is of less importance than the fact that the field for the use of copper throughout the world is likely to extend. If this extension is to be met by copper, in competition with aluminium or other possible substitutes, it is essential that the demand can be fully catered for at reasonable prices.

Progress of Gold Mining Interests

We are maintaining our activity and interest in the search for new gold areas and their development. A syndicate known as the Western Areas No. 2 Prospect has been formed under the management of your company. The syndicate, in which we have a 37½ per cent contributing interest, is undertaking a prospecting programme in the neighbourhood of the Western Areas Gold Mining Company lease area. We have also formed syndicates under our management to undertake three major prospecting projects, one to the North of the new goldfield in the Leslie/Kinross area, one near the Klerksdorp goldfields and one in the Kroonstad area. These projects, in which we have a 44 per cent contributing interest, will take several years to complete.

Progress at Western Areas Gold Mining Company Limited, in which we have a substantial investment, has been gratifying and there seems little doubt that production will commence before the date anticipated by Western Areas in the prospectus issued by that company.

Investment in Africa

The chairman then gave a detailed review of the changes taking place in Africa and outlined the bearing they may have on the affairs of the company, and continued: My remarks indicate, I think, a measure of confidence, firstly, that industry will be able to continue in production on the African Continent, notwithstanding the impact of rapidly changing circumstances and, secondly that the profitability of industry need not necessarily be seriously affected by rising labour costs.

Apart from the maintenance of profitable production, there are, as I have already mentioned, other uncertainties which give rise to anxiety on the part of investors. They may be concerned that capital invested in Africa might be subject to special risks such as control on the movement of funds, or, in extreme cases, expropriation or nationalization. They may also fear that continuing adverse market conditions may render it difficult or impossible to realize, at will, the capital invested. They may fear that the high cost of the changes now being made throughout Africa will result in a higher level of taxation.

It is not at present possible to foretell whether these fears are justified nor to make any satisfactory assessment of the risk involved in the various areas where our interests lie. I would, however, point out that our direct investments in Africa are almost wholly confined to the Union and the Rhodesias where the capital invested is, in my opinion, comparatively safe from the major risk of expropriation and from undue control on the movement of funds. While your Directors are naturally fully aware of the potential dangers inherent in investment in Africa at the present time, we are of the opinion that the substantial rewards obtainable from such current investment outweigh the potential risks as we now see them.

Given no major disturbances in the immediate future, it is likely that our dividend income for the current year will be somewhat greater than that for the year ended June 30, 1960.

MINING FINANCE—*Continued*

for ore making, because of its resemblance to the folding in which the main Broken Hill orebody occurs. Diamond drilling into this structure has reached depths of 4,520 ft. and 5,831 ft. from surface.

The company has entered into an agreement with Consolidated Zinc Pty. Ltd. for merging of leases held in the Cobar district, New South Wales, Broken Hill South to hold a 76.66 per cent interest. Work of these companies has shown that there are large tonnages of copper and gold ores in this field, but economic development will depend upon a satisfactory level of costs in relation to the grade of ore available, a position more likely to be achieved if all mines are operated jointly.

Extensions in depth at the Chesney and C.S.A. Mines are being prospected by diamond drilling.

De Beers Industrial Dividend—De Beers Industrial Corporation has declared a final dividend of 1s. 3d. making 2s. 3d. for 1960 (2s. in 1959). Net profit after tax and payment of preference dividends for the year is estimated at £1,505,000 (£1,134,917 in 1959).

Zandpan Rights issue—Zandpan Gold Mining reports that 84% of the new shares offered to shareholders on a two for three held basis have been taken up.

Johnson Matthey acquires Swedish interest—Johnson Matthey & Company, refiners and manufacturers of precious metals, have acquired a controlling interest in the Swedish precious metal company A/B Gösta Nyström. This Stockholm company, in future to be known as A/B Nyström and Matthey, supplies precious metal products for all industrial purposes as well as for jewellery, silversmith and dental requirements. The company has been Johnson Matthey's agent in Sweden since 1932.

Mr. J. Ivan Spens—It was announced at last week's Amalgamated Tin meeting that Mr. Spens would be resigning from the chairmanship of the company at the end of next March in favour of Sir Douglas Waring. Mr. Spens will also be retiring from the chairmanship of the London Tin Corporation at the same date and under a new article recently adopted by shareholders, it is intended that he shall, on his retirement, become the first president of the Corporation.

★

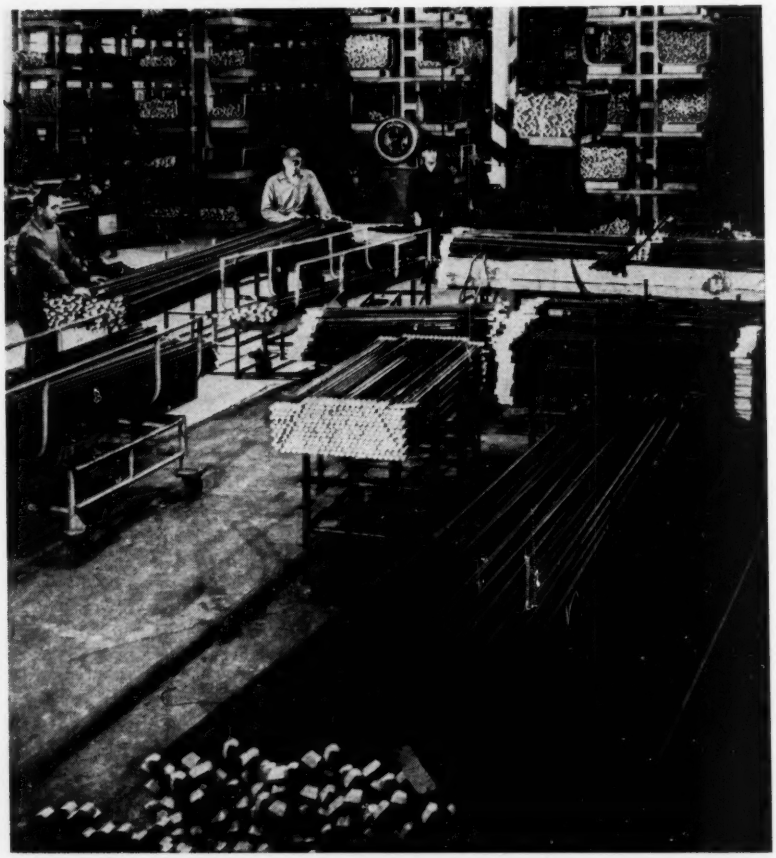
The board of directors of Bancroft Mines announces that Mr. R. A. Mudd has been appointed general manager of Bancroft Mines as successor to the late Mr. A. J. Brink. Mr. Mudd will take up his appointment early in 1961.

Speeding Supplies for Miners

On November 25, a new factory for the production of rock drilling equipment was opened in Stockholm by the Sandvik Steel Works Co. Ltd. Built at a cost of £413,000 (including equipment), the new factory will mainly produce detachable bits and extension steels for drilling holes of more than 1½ ins. (40 mm.) dia. The new factory has been equipped with up-to-date machine tools, some of unusual design. A feature of the new premises is a hardening department planned specifically for drillsteel manufacture.

The biggest detachable bits which will be made will be 9 ins. (230 mm.) in diameter. Each of these weighs 132 lbs. (60 kgs.) including the tungsten carbide insert, which itself weighs 17½ lbs. (8 kgs.). These figures form an intriguing contrast to one of the smallest Sandvik products, a plughole drillsteel, 0.3 in. in dia. and weighing only ozs.

At the opening ceremony Mr. Wilhelm Haglund, managing director of Sandvik Steel Works, pointed out that the new factory is not the only example of the company's expansion. Of recent months Sandvik have built extensions to their electro-steel works, a warehouse for tubes, and enlargements of their Coromant tool factory.



CORRESPONDENCE

Bridging the Copper Gap

The Editor,
The Mining Journal Ltd.

Dear Sir,

In your October 7 issue you had an interesting article entitled "Bridging the Copper Gap". In the third paragraph appeared the following two sentences:

"To complete a day of alternate bearish and bullish tidings, it was announced that U.S. custom smelters, led by A.S.A.R.C.O., had reduced their price by 2c. to 31c. a lb. The net effect of these conflicting developments on market sentiment was a fall in cash copper of £5⅝ on the day."

This quotation gives the impression that the London price dropped after this company and others had marked down our sales price in the United States.

Due to the difference in time between London and New York, this was not the case. At 9.00 New York time we already knew the price established in London at the noon session on Monday, October 3. Therefore, in point of time the reduction of 2c. per pound which we announced at about 10.00 New York time, October 3, occurred several hours after the price in London had fallen about £5 from the level prevailing on the previous trading day which was September 30.

What I am trying to say is that the London market could not have been influenced in any way on October 3, by our decision to reduce the price here in the United States since the decision was not known at the time the London market was established.

Sincerely yours,

SIMON D. STRAUSS

American Smelting and Refining Company,
120 *Broadway*,
New York 5, N.Y.

[Mr. Strauss is, of course, correct in saying that the fall in the London copper price on October 3 occurred prior to the official announcement of the U.S. custom smelters' price reduction. At the beginning of October, the view was undoubtedly held in London market circles that a price reduction by the U.S. smelters was both unavoidable and imminent and in our opinion this assessment contributed to the weakening of the London quotation on October 3.—*Ed. M.J.*]

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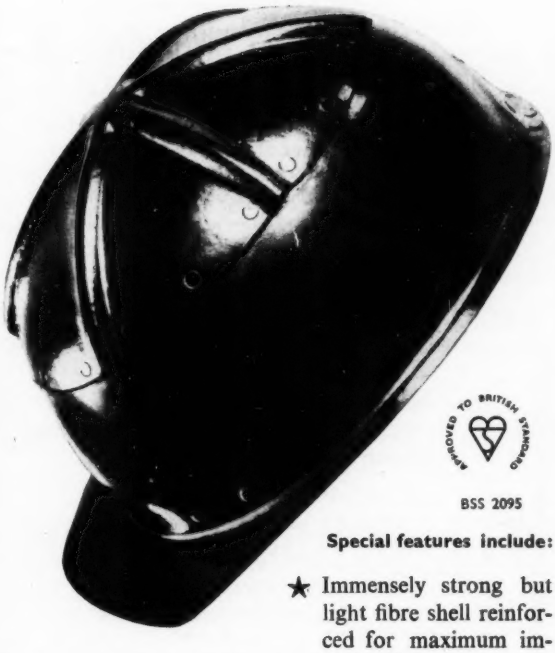

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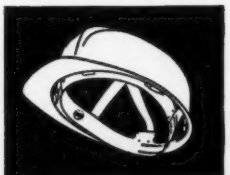

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Personal

Sir Percy Hunting, chairman of the Hunting Group of shipping, oil, aviation, survey and engineering companies, is retiring from the end of 1960. He will be succeeded by his brother, Mr. G. L. Hunting, the present vice-chairman. Sir Percy's son, Mr. Pat Hunting, will become vice-chairman.

*

The Hunting Group of Companies in South Africa announce the following changes in the organization of their companies: *Aircraft Operating Co. (Aerial Surveys) Ltd.* Mr. W. D. Corse is retiring as managing director, on December 31 next, but will remain as a member of the board; Mr. E. J. D. Pritchard will become managing director on January 1, 1961; Mr. G. T. Gibbs, has been appointed as a full director from that date, and will continue as general manager; Mr. R. F. Ashdown, company secretary, and alternate director, will, in addition, assume the post of commerical manager; Mr. F. P. Roos, previously production manager and alternate director, has been appointed as technical representative and will be responsible for promoting aerial survey on behalf of the company. *Field Aircraft Services Africa, Ltd.* Mr. E. J. D. Pritchard has been appointed managing director from January 1 next, and Mr. S. H. Evans will become a full director of the company. He will continue as general manager *Hunting Surveys (Rhodesia) (Pvt.) Ltd.* Mr. P. H. O'Brien has been appointed to the board as resident director and Mr. J. Scott has been appointed manager. *Field Aircraft Services (Rhodesia) (Pvt.) Ltd.* Mr. E. J. D. Pritchard who has held the appointments of chairman and managing director, relinquishes his position as managing director. Mr. J. L. Boon, the present sales director, has been appointed managing director, as from January 1, 1961.

*

At the annual meeting of the Cobalt Development Institute in Brussels, Mr. J. H. Lascelles, resident director of the Rhodesian Selection Trust, was named as the next chairman following Mr. H. Robiliart, managing director of Union Miniere du Haut-Katanga whose chairmanship expires this year. Mr. Charles Piedboeuf, was re-elected as vice-chairman.

*

Mr. E. S. Everitt has been elected to the board of directors of Bucyrus-Erie Co. of South Milwaukee, Wisconsin, U.S. Mr. Everitt is managing director of Ruston Bucyrus Ltd., of Lincoln.

*

Mr. Harry West, managing director of Associated Electrical Industries (Manchester) Ltd., has been appointed to the board of Associated Electrical Industries Ltd., with effect from January 1, 1961.

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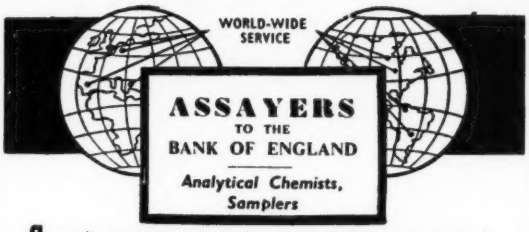

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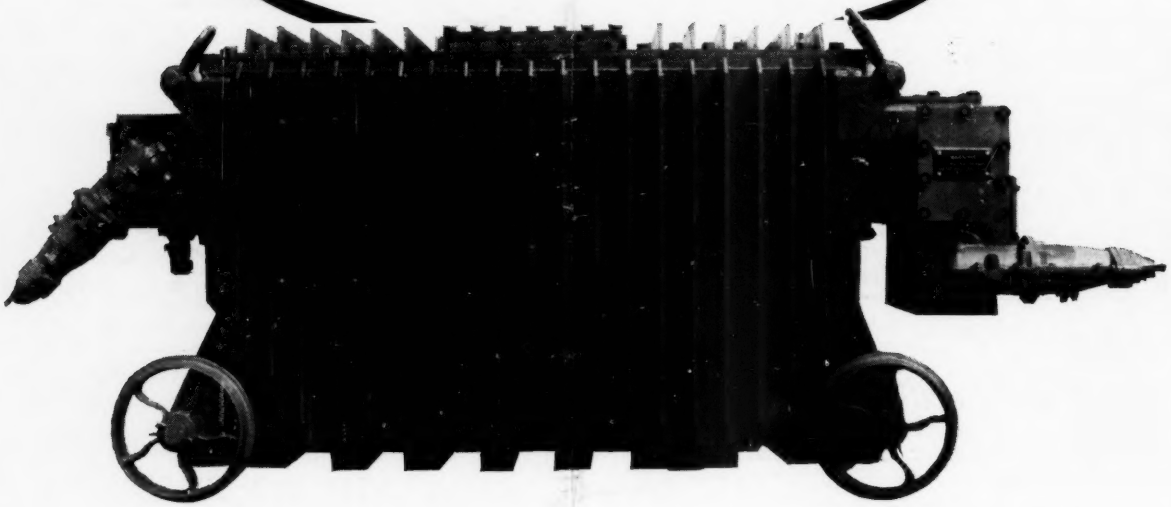

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